

### UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

### REGION 5 CHICAGO REGIONAL LABORATORY

### 536 SOUTH CLARK STREET CHICAGO, ILLINOIS 60605



Certificate # L2280 Testing

Date: 1/21/2015

Subject: Review of Region 5 Data for BP Whiting Refinery

To: Air Division, US EPA Region 5

77 West Jackson Boulevard

Chicago, IL 60605

From: Wayne Whipple, Analyst

**US EPA Region 5 Chicago Regional Laboratory** 

The data transmitted under this cover memo successfully passed CRL's data review procedures as documented in the current Quality Management Plan and applicable Standard Operating Procedures. In accordance with EPA's *Guidance on Environmental Data Verification and Data Validation* (Document EPA QA/G-8), CRL verified and validated the data but does not perform data quality assessment based on project plans.

This report was reviewed and the information provided herein accurately represents the analysis performed.

Wayn / Whep 21 Jan 2015

Please contact the analyst with any technical report issues, Amanda Wroble at (312)-353-0375 for sample project concerns, and Sylvia Griffin at (312)-353-9073 with data transmittal questions. Thank you.

Attached are Results for: BP Whiting Refinery

Data Management Coordinator and DateTransmitted

Analyses included in this report:

Air Toxics Reimer 5

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### **Chicago Regional Laboratory**

536 South Clark Street, Chicago, IL 60605 Phone:(312)353-8370 Fax:(312)886-2591

Air Division, US EPA Region 5 Project: BP Whiting Refinery
77 West Jackson Boulevard Project Number: [none]

Chicago IL, 60605 Project Manager: Motria Caudill

**Reported:** Jan-21-15 11:50

#### Analysis Case Narrative for Volatile Organic Compounds (VOC) Air Toxics

Wayne J. Whipple, Ph.D. phone (312) 353-9063 email whipple.wayne@epa.gov

#### **General Information**

Three 15 L canisters and two six liter canisters were received in good condition from the Air and Radiation Division monitoring group on October 16, 2014. The samples met hold time.

The samples were analyzed for VOC Air Toxics using SOP MS-005 Revision 6 with cold trap dehydration preconcentrator on Pegasus. (Reference Method US EPA TO-15). There are three pen and ink changes to the SOP, MS-005 r6 PI01, 02, 03 that allow for using the LECO manufacture tune recommendations for tune criteria, allowing the use of the Pegasus instruments and an updated compound list from the available standards and the last change updates the sample monitoring compounds to current concentrations and extends the acceptance limits to the analytical limits.

Data are reported to a reporting limit of 25 pptv and at least 35 pptv was requested in the Quality Assurance Project Plan, QAPP "Passive Tube Canister Comparison Study\_QAPP 082514"

#### Standard Operating Procedures (SOP) and Method Deviations

The criteria used for determining if system contamination influences the sample results is for a sample result to be over three to five times the contamination in the method blank or the canister certification check blank.

The LCS limits are taken from the SOP and not the LIMS limits. The LIMS limits are for tracking purposes only.

#### Sample Analysis and Results

Propene is a combination of propane and propene that cannot be resolved. The compounds is flagged K as a high bias.

Propene, dichlorotetrafluoroethane, 1,1,2-trichloro-1,2,2-trifluroromethane, cyclohexane, 2-butanone, and acetone have their reporting limit raised to 50 pptv because the calibration curve lowest reporting limit was not acceptable up to the 50 pptv calibration level.

Acrolein and 1,3 butadiene are flagged high bias because of interferences from hydrocarbons in all the samples that



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cannot be resolved. It is very likely the results are a large overestimate.

Methylene chloride is present in the canister certification blank at half the concentration reported and therefore may have a high bias from canister contamination for samples -01, -02 and -03. The analyte is flagged K for high bias for that sample.

Acetone was reported from the diluted samples in all samples except -03. The results of these compounds in the sample duplicate are reported from the undiluted sample and are estimated.

Naphthalene is present in all the canister certification blanks but since the compound is already flagged as estimated no further qualifications are necessary.

4-Ethyltoluene appears to be coeluting with an unknown aromatic hydrocarbon that has a similar mass spectrum. The peak is asymmetric suggesting the coelution. The result is reported as 4-ethyl toluene but with a K flag suggesting a high bias from the coelution. The unknown suspected compound is most likely a similar aromatic hydrocarbon.

#### **Quality Control**

Isopropyl alcohol failed calibration and is flagged J as estimated.

Ethanol, acetone, acrolein and naphthalene failed a continuing calibration and is flagged J in all samples. Naphthalene is flagged as estimated because the performance of the analytical system is not as reliable having an acceptable calibration response above 250 pptv for that late eluting compound and it fails the second source calibration check (ICV).

Dichlorotetrafluoroethane and 1,1,1-trichloroethane is reported below the reporting and /or detection limit for tracking of the sample monitoring compound. The result is within the expected global results, although is still flagged. The result is also within 5 times the blank result but it is already flagged as estimated so no further action is required.

Carbon disulfide is rejected because of poor analytical performance.

4-Methyl-2-pentanone Is flagged K, high bias because the concentration in the samples are within a factor of 5 from the concentration detected in the method blank.



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77 West Jackson Boulevard Project Number: [none] Reported:
Chicago IL, 60605 Project Manager: Motria Caudill Jan-21-15 11:50

#### ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
4	1410020-01	Air	Oct-16-14 08:40	Oct-16-14 11:00
1	1410020-02	Air	Oct-16-14 09:20	Oct-16-14 11:00
3	1410020-03	Air	Oct-16-14 10:00	Oct-16-14 11:00
2	1410020-04	Air	Oct-16-14 10:30	Oct-16-14 11:00
2	1410020-05	Air	Oct-16-14 10:30	Oct-16-14 11:00

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#### **Environmental Protection Agency Region 5**

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536 South Clark Street, Chicago, IL 60605 Phone:(312)353-8370 Fax:(312)886-2591

Project: BP Whiting Refinery

77 West Jackson Boulevard Project Number: [none] Reported:
Chicago IL, 60605 Project Manager: Motria Caudill Jan-21-15 11:50

# Air Toxics by GC/MS, EPA TO-15 (modified) US EPA Region 5 Chicago Regional Laboratory

4 (1410020-01) Air Sampled: Oct-16-14 08:40 Received: Oct-16-14 11:00

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
Propene	1.08	K		0.0500	ppbv	1	B410068	Oct-16-14	Oct-16-14
Chloromethane	0.532			0.0250	"	"	"	"	"
Vinyl chloride	U			0.0250	"	"	"	"	"
1,3-butadiene	0.0406	K		0.0250	"	"	"	"	"
Bromomethane	U			0.0250	"	"	"	"	"
Chloroethane	U			0.0250	"	"	"	"	"
Ethanol	1.36	J		0.0250	"	"	"	"	"
Acrolein	0.516	J, K		0.0250	"	"	"	"	"
1,1-Dichloroethene	U			0.0250	"	"	"	"	"
Methylene chloride	0.134	BC		0.0250	"	"	"	"	"
Carbon disulfide	Rejected			0.0250	"	"	"	"	"
Methyl tert-butyl ether	U			0.0250	"	"	"	"	"
1,1-Dichloroethane	U			0.0250	"	"	"	"	"
Vinyl acetate	U			0.0250	"	"	"	"	"
Hexane	0.307			0.0250	"	"	"	"	"
2-Butanone	0.339			0.0500	"	"	"	"	"
cis-1,2-Dichloroethene	U			0.0250	"	"	"	"	"
trans-1,2-Dichloroethene	U			0.0250	"	"	"	"	"
Chloroform	0.0268			0.0250	"	"	"	"	"
Ethyl acetate	0.157			0.0250	"	"	"	"	"
1,2-Dichloroethane	U			0.0250	"	"	"	"	"
Cyclohexane	0.195			0.0500	"	"	"	"	"
Tetrahydrofuran	U			0.0250	"	"	"	"	"
Benzene	0.235			0.0250	"	"	"	"	"
n-Heptane	0.136			0.0250	"	"	"	"	"
1,2-Dichloropropane	U			0.0250	"	"	"	"	"
Trichloroethene	U			0.0250	"	"	"	"	"
Bromodichloromethane	U			0.0250	"	"	"	"	"
Methyl methacrylate	U			0.0250	"	"	"	"	"
1,4-Dioxane	U			0.0250	"	"	"	"	"
cis-1,3-Dichloropropene	U			0.0250	"	"	"	"	"
4-Methyl-2-pentanone	0.0420	K		0.0250	"	"	"	"	"
trans-1,3-Dichloropropene	U			0.0250	"	"	"	"	"
1,1,2-Trichloroethane	U			0.0250	"	"	"	"	"
Dibromochloromethane	U			0.0250	"	"	"	"	"



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4 (1410020-01) Air Sampled: Oct-16-14 08:40 Received: Oct-16-14 11:00

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
Toluene	0.450			0.0250	ppbv	1	B410068	Oct-16-14	Oct-16-14
2-Hexanone	U			0.0250	"	"	"	"	"
1,2-Dibromoethane (EDB)	U			0.0250	"	"	"	"	"
Tetrachloroethene	U			0.0250	"	"	"	"	"
Chlorobenzene	U			0.0250	"	"	"	"	"
Ethylbenzene	0.0528			0.0250	"	"	"	"	"
m+p-Xylene	0.162	BC		0.0500	"	"	"	"	"
Bromoform	U			0.0250	"	"	"	"	"
Styrene	0.0256			0.0250	"	"	"	"	"
1,1,2,2-Tetrachloroethane	U			0.0250	"	"	"	"	"
o-Xylene	0.0604			0.0250	"	"	"	"	"
4-ethyltoluene	0.0558	K		0.0250	"	"	"	"	"
1,3,5-Trimethylbenzene	U			0.0250	"	"	"	"	"
1,2,4-Trimethylbenzene	0.0529			0.0250	"	"	"	"	"
1,3-Dichlorobenzene	U			0.0250	"	"	"	"	"
Benzyl chloride	U			0.0250	"	"	"	"	"
1,4-Dichlorobenzene	U			0.0250	"	"	"	"	"
1,2-Dichlorobenzene	U			0.0250	"	"	"	"	"
Hexachlorobutadiene	U			0.0250	"	"	"	"	"
1,2,4-Trichlorobenzene	U			0.0250	"	"	"	"	"
Naphthalene	0.622	BC, J		0.0250	"	"	"	"	"

Surogate	Result		%REC	%REC Limits	Batch	Prepared	Analyzed
Surrogate: Dichlorodifluoromethane	0.512	J	97%	90-120	"	"	"
Surrogate: Dichlorotetrafluoroethane	0.0227	J	114%	80-120	"	"	"
Surrogate: Trichlorofluoromethane	0.241		101%	90-120	"	"	"
Surrogate: 1,1,2-trichloro-1,2,2-trifluoroethane (Fi	0.0870		119%	90-120	"	"	"
Surrogate: 1,1,1-Trichloroethane	3.83E-3	J	77%	80-120	"	"	"
Surrogate: Carbon tetrachloride	0.0884		103%	80-120	"	"	"



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Project: BP Whiting Refinery

77 West Jackson Boulevard Project Number: [none] Reported:
Chicago IL, 60605 Project Manager: Motria Caudill Jan-21-15 11:50

## Air Toxics by GC/MS, EPA TO-15 (modified) US EPA Region 5 Chicago Regional Laboratory

4 (1410020-01RE1) Air Sampled: Oct-16-14 08:40 Received: Oct-16-14 11:00

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
Isopropyl alcohol	4.08	J		0.125	ppbv	5	B410068	Oct-16-14	Oct-16-14
Acetone	3.61	J		0.250	"	"	"	"	"

#### 1 (1410020-02) Air Sampled: Oct-16-14 09:20 Received: Oct-16-14 11:00

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
Propene	1.37	K		0.0500	ppbv	1	B410068	Oct-16-14	Oct-16-14
Chloromethane	0.582			0.0250	"	"	"	"	"
Vinyl chloride	U			0.0250	"	"	"	"	"
1,3-butadiene	0.0440	K		0.0250	"	"	"	"	"
Bromomethane	U			0.0250	"	"	"	"	"
Chloroethane	U			0.0250	"	"	"	"	"
Ethanol	1.02	J		0.0250	"	"	"	"	"
Acrolein	0.688	J, K		0.0250	"	"	"	"	"
Isopropyl alcohol	0.530	J		0.0250	"	"	"	"	"
1,1-Dichloroethene	U			0.0250	"	"	"	"	"
Methylene chloride	0.110	BC		0.0250	"	"	"	"	"
Carbon disulfide	Rejected			0.0250	"	"	"	"	"
Methyl tert-butyl ether	U			0.0250	"	"	"	"	"
1,1-Dichloroethane	U			0.0250	"	"	"	"	"
Vinyl acetate	U			0.0250	"	"	"	"	"
Hexane	0.480			0.0250	"	"	"	"	"
2-Butanone	0.280			0.0500	"	"	"	"	"
cis-1,2-Dichloroethene	U			0.0250	"	"	"	"	"
trans-1,2-Dichloroethene	U			0.0250	"	"	"	"	"
Chloroform	U			0.0250	"	"	"	"	"
Ethyl acetate	0.0981			0.0250	"	"	"	"	"
1,2-Dichloroethane	U			0.0250	"	"	"	"	"
Cyclohexane	0.476			0.0500	"	"	"	"	"
Tetrahydrofuran	U			0.0250	"	"	"	"	"
Benzene	0.286			0.0250	"	"	"	"	"
n-Heptane	0.332			0.0250	"	"	"	"	"
1,2-Dichloropropane	U			0.0250	"	"	"	"	"
Trichloroethene	U			0.0250	"	"	"	"	"
Bromodichloromethane	U			0.0250	"	"	"	"	"



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Project: BP Whiting Refinery

77 West Jackson Boulevard Project Number: [none] Reported:
Chicago IL, 60605 Project Manager: Motria Caudill Jan-21-15 11:50

# Air Toxics by GC/MS, EPA TO-15 (modified) US EPA Region 5 Chicago Regional Laboratory

1 (1410020-02) Air Sampled: Oct-16-14 09:20 Received: Oct-16-14 11:00

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
Methyl methacrylate	U			0.0250	ppbv	1	B410068	Oct-16-14	Oct-16-14
1,4-Dioxane	U			0.0250	"	"	"	"	"
cis-1,3-Dichloropropene	U			0.0250	"	"	"	"	"
4-Methyl-2-pentanone	0.0681	K		0.0250	"	"	"	"	"
trans-1,3-Dichloropropene	U			0.0250	"	"	"	"	"
1,1,2-Trichloroethane	U			0.0250	"	"	"	"	"
Dibromochloromethane	U			0.0250	"	"	"	"	"
Toluene	0.610			0.0250	"	"	"	"	"
2-Hexanone	U			0.0250	"	"	"	"	"
1,2-Dibromoethane (EDB)	U			0.0250	"	"	"	"	"
Tetrachloroethene	U			0.0250	"	"	"	"	"
Chlorobenzene	U			0.0250	"	"	"	"	"
Ethylbenzene	0.0836			0.0250	"	"	"	"	"
m+p-Xylene	0.269			0.0500	"	"	"	"	"
Bromoform	U			0.0250	"	"	"	"	"
Styrene	U			0.0250	"	"	"	"	"
1,1,2,2-Tetrachloroethane	U			0.0250	"	"	"	"	"
o-Xylene	0.0976			0.0250	"	"	"	"	"
4-ethyltoluene	0.0883	K		0.0250	"	"	"	"	"
1,3,5-Trimethylbenzene	0.0295			0.0250	"	"	"	"	"
1,2,4-Trimethylbenzene	0.0950			0.0250	"	"	"	"	"
1,3-Dichlorobenzene	U			0.0250	"	"	"	"	"
Benzyl chloride	U			0.0250	"	"	"	"	"
1,4-Dichlorobenzene	U			0.0250	"	"	"	"	"
1,2-Dichlorobenzene	U			0.0250	"	"	"	"	"
Hexachlorobutadiene	U			0.0250	"	"	"	"	"
1,2,4-Trichlorobenzene	U			0.0250	"	"	"	"	"
Naphthalene	0.679	BC, J		0.0250	"	"	"	"	"
Surogate	Result			%REC		%REC Limits	Batch	Prepared	Analyzed
Surrogate: Dichlorodifluoromethane	0.492	J		94%		90-120	"	"	"
Surrogate: Dichlorotetrafluoroethane	0.0224	J		112%		80-120	"	"	"
Surrogate: Trichlorofluoromethane	0.234			98%		90-120	"	"	"
Surrogate: 1,1,2-trichloro-1,2,2-trifluoroethane (Fi	0.0845			116%		90-120	"	"	"
Surrogate: 1,1,1-Trichloroethane	4.08E-3	J		82%		80-120	"	"	"
Surrogate: Carbon tetrachloride	0.0906	·		105%				"	,,



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# Air Toxics by GC/MS, EPA TO-15 (modified) US EPA Region 5 Chicago Regional Laboratory

1 (1410020-02RE1) Air Sampled: Oct-16-14 09:20 Received: Oct-16-14 11:00

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
Acetone	2.62	J		0.250	ppbv	5	B410068	Oct-16-14	Oct-16-14

#### 3 (1410020-03) Air Sampled: Oct-16-14 10:00 Received: Oct-16-14 11:00

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
Propene	1.48	K		0.0500	ppbv	1	B410068	Oct-16-14	Oct-16-14
Chloromethane	0.502			0.0250	"	"	"	"	"
Vinyl chloride	U			0.0250	"	"	"	"	"
1,3-butadiene	0.0459	K		0.0250	"	"	"	"	"
Bromomethane	U			0.0250	"	"	"	"	"
Chloroethane	U			0.0250	"	"	"	"	"
Ethanol	0.881	J		0.0250	"	"	"	"	"
Acrolein	0.410	J, K		0.0250	"	"	"	"	"
Isopropyl alcohol	0.271	J		0.0250	"	"	"	"	"
Acetone	1.88	J		0.0500	"	"	"	"	"
1,1-Dichloroethene	U			0.0250	"	"	"	"	"
Methylene chloride	0.101	BC		0.0250	"	"	"	"	"
Carbon disulfide	Rejected			0.0250	"	"	"	"	"
Methyl tert-butyl ether	U			0.0250	"	"	"	"	"
1,1-Dichloroethane	U			0.0250	"	"	"	"	"
Vinyl acetate	U			0.0250	"	"	"	"	"
Hexane	0.253			0.0250	"	"	"	"	"
2-Butanone	0.245			0.0500	"	"	"	"	"
cis-1,2-Dichloroethene	U			0.0250	"	"	"	"	"
trans-1,2-Dichloroethene	U			0.0250	"	"	"	"	"
Chloroform	0.0312			0.0250	"	"	"	"	"
Ethyl acetate	0.105			0.0250	"	"	"	"	"
1,2-Dichloroethane	U			0.0250	"	"	"	"	"
Cyclohexane	0.266			0.0500	"	"	"	"	"
Tetrahydrofuran	U			0.0250	"	"	"	"	"
Benzene	0.208			0.0250	"	"	"	"	"
n-Heptane	0.138			0.0250	"	"	"	"	"
1,2-Dichloropropane	U			0.0250	"	"	"	"	"
Trichloroethene	U			0.0250	"	"	"	"	"
Bromodichloromethane	U			0.0250	"	"	"	"	"



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Project: BP Whiting Refinery

77 West Jackson Boulevard Project Number: [none] Reported:
Chicago IL, 60605 Project Manager: Motria Caudill Jan-21-15 11:50

# Air Toxics by GC/MS, EPA TO-15 (modified) US EPA Region 5 Chicago Regional Laboratory

3 (1410020-03) Air Sampled: Oct-16-14 10:00 Received: Oct-16-14 11:00

		Flags /		Reporting					
Analyte	Result	Qualifiers	MDL	Limit	Units	Dilution	Batch	Prepared	Analyzed
Methyl methacrylate	U			0.0250	ppbv "	1 "	B410068	Oct-16-14	Oct-16-14
1,4-Dioxane	U			0.0250	"	"	"	"	"
cis-1,3-Dichloropropene	U	TZ.		0.0250	,,	,,	,,	,,	,,
4-Methyl-2-pentanone	0.0492	K		0.0250		,,	,,	"	,,
trans-1,3-Dichloropropene	U			0.0250	"	"	"	"	"
1,1,2-Trichloroethane	U			0.0250	"	"	"	"	
Dibromochloromethane	U			0.0250	"	"	"	"	"
Toluene	0.419			0.0250					"
2-Hexanone	U			0.0250	"	"	"	"	"
1,2-Dibromoethane (EDB)	U			0.0250	"	"	"		"
Tetrachloroethene	U			0.0250	"	"	"	"	"
Chlorobenzene	U			0.0250	"	"	"	"	"
Ethylbenzene	0.0642			0.0250	"	"	"	"	"
m+p-Xylene	0.210			0.0500	"	"	"	"	"
Bromoform	U			0.0250	"	"	"	"	"
Styrene	U			0.0250	"	"	"	"	"
1,1,2,2-Tetrachloroethane	U			0.0250	"	"	"	"	"
o-Xylene	0.0756			0.0250	"	"	"	"	"
4-ethyltoluene	0.0674	K		0.0250	"	"	"	"	"
1,3,5-Trimethylbenzene	U			0.0250	"	"	"	"	"
1,2,4-Trimethylbenzene	0.0662			0.0250	"	"	"	"	"
1,3-Dichlorobenzene	U			0.0250	"	"	"	"	"
Benzyl chloride	U			0.0250	"	"	"	"	"
1,4-Dichlorobenzene	U			0.0250	"	"	"	"	"
1,2-Dichlorobenzene	U			0.0250	"	"	"	"	"
Hexachlorobutadiene	U			0.0250	"	"	"	"	"
1,2,4-Trichlorobenzene	U			0.0250	"	"	"	"	"
Naphthalene	0.547	BC, J		0.0250	"	"	"	"	"
Surogate	Result			%REC		%REC Limits	Batch	Prepared	Analyzed
Surrogate: Dichlorodifluoromethane	0.480	J		91%		90-120	"	"	"
Surrogate: Dichlorotetrafluoroethane	0.0228	J		114%		80-120	"	"	"
Surrogate: Trichlorofluoromethane	0.230			96%		90-120	"	"	"
Surrogate: 1,1,2-trichloro-1,2,2-trifluoroethane (F	0.0844			116%		90-120	"	"	"
Surrogate: 1,1,1-Trichloroethane	3.87E-3	J		77%		80-120	"	"	"
	0.0935	J		109%		80-120 80-120	"	"	"
Surrogate: Carbon tetrachloride	0.0933			109%		00-120			-



### **Environmental Protection Agency Region 5**

## **Chicago Regional Laboratory**

536 South Clark Street, Chicago, IL 60605 Phone:(312)353-8370 Fax:(312)886-2591

Project: BP Whiting Refinery

77 West Jackson Boulevard Project Number: [none] Reported:
Chicago IL, 60605 Project Manager: Motria Caudill Jan-21-15 11:50

# Air Toxics by GC/MS, EPA TO-15 (modified) US EPA Region 5 Chicago Regional Laboratory

2 (1410020-04) Air Sampled: Oct-16-14 10:30 Received: Oct-16-14 11:00

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
Propene	1.69	K		0.0500	ppbv	1	B410068	Oct-16-14	Oct-16-14
Chloromethane	0.517			0.0250	"	"	"	"	"
Vinyl chloride	U			0.0250	"	"	"	"	"
1,3-butadiene	0.0428	K		0.0250	"	"	"	"	"
Bromomethane	U			0.0250	"	"	"	"	"
Chloroethane	U			0.0250	"	"	"	"	"
Ethanol	1.22	J		0.0250	"	"	"	"	"
Acrolein	0.558	J, K		0.0250	"	"	"	"	"
Isopropyl alcohol	0.593	J		0.0250	"	"	"	"	"
1,1-Dichloroethene	U			0.0250	"	"	"	"	"
Methylene chloride	0.102			0.0250	"	"	"	"	"
Carbon disulfide	Rejected			0.0250	"	"	"	"	"
Methyl tert-butyl ether	U			0.0250	"	"	"	"	"
1,1-Dichloroethane	U			0.0250	"	"	"	"	"
Vinyl acetate	U			0.0250	"	"	"	"	"
Hexane	0.361			0.0250	"	"	"	"	"
2-Butanone	0.322			0.0500	"	"	"	"	"
cis-1,2-Dichloroethene	U			0.0250	"	"	"	"	"
trans-1,2-Dichloroethene	U			0.0250	"	"	"	"	"
Chloroform	U			0.0250	"	"	"	"	"
Ethyl acetate	0.127			0.0250	"	"	"	"	"
1,2-Dichloroethane	0.0256			0.0250	"	"	"	"	"
Cyclohexane	0.340			0.0500	"	"	"	"	"
Tetrahydrofuran	U			0.0250	"	"	"	"	"
Benzene	0.287			0.0250	"	"	"	"	"
n-Heptane	0.196			0.0250	"	"	"	"	"
1,2-Dichloropropane	U			0.0250	"	"	"	"	"
Trichloroethene	U			0.0250	"	"	"	"	"
Bromodichloromethane	U			0.0250	"	"	"	"	"
Methyl methacrylate	U			0.0250	"	"	"	"	"
1,4-Dioxane	U			0.0250	"	"	"	"	"
cis-1,3-Dichloropropene	U			0.0250	"	"	"	"	"
4-Methyl-2-pentanone	0.0396	K		0.0250	"	"	"	"	"
trans-1,3-Dichloropropene	U			0.0250	"	"	"	"	"
1,1,2-Trichloroethane	U			0.0250	"	"	"	"	"
Dibromochloromethane	U			0.0250	"	"	"	"	"



#### **Environmental Protection Agency Region 5**

## **Chicago Regional Laboratory**

536 South Clark Street, Chicago, IL 60605 Phone:(312)353-8370 Fax:(312)886-2591

Project: BP Whiting Refinery

77 West Jackson Boulevard Project Number: [none] Reported:
Chicago IL, 60605 Project Manager: Motria Caudill Jan-21-15 11:50

# Air Toxics by GC/MS, EPA TO-15 (modified) US EPA Region 5 Chicago Regional Laboratory

2 (1410020-04) Air Sampled: Oct-16-14 10:30 Received: Oct-16-14 11:00

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
Toluene	0.519			0.0250	ppbv	1	B410068	Oct-16-14	Oct-16-14
2-Hexanone	U			0.0250	"	"	"	"	"
1,2-Dibromoethane (EDB)	U			0.0250	"	"	"	"	"
Tetrachloroethene	U			0.0250	"	"	"	"	"
Chlorobenzene	U			0.0250	"	"	"	"	"
Ethylbenzene	0.0758			0.0250	"	"	"	"	"
m+p-Xylene	0.242			0.0500	"	"	"	"	"
Bromoform	U			0.0250	"	"	"	"	"
Styrene	U			0.0250	"	"	"	"	"
1,1,2,2-Tetrachloroethane	U			0.0250	"	"	"	"	"
o-Xylene	0.0835			0.0250	"	"	"	"	"
4-ethyltoluene	0.0752	K		0.0250	"	"	"	"	"
1,3,5-Trimethylbenzene	U			0.0250	"	"	"	"	"
1,2,4-Trimethylbenzene	0.0715			0.0250	"	"	"	"	"
1,3-Dichlorobenzene	U			0.0250	"	"	"	"	"
Benzyl chloride	U			0.0250	"	"	"	"	"
1,4-Dichlorobenzene	U			0.0250	"	"	"	"	"
1,2-Dichlorobenzene	U			0.0250	"	"	"	"	"
Hexachlorobutadiene	U			0.0250	"	"	"	"	"
1,2,4-Trichlorobenzene	U			0.0250	"	"	"	"	"
Naphthalene	0.665	J		0.0250	"	"	"	"	"

Surogate	Result		%REC	%REC Limits	Batch	Prepared	Analyzed
Surrogate: Dichlorodifluoromethane	0.459	J	88%	90-120	"	"	"
Surrogate: Dichlorotetrafluoroethane	0.0244	J	122%	80-120	"	"	"
Surrogate: Trichlorofluoromethane	0.230		96%	90-120	"	"	"
Surrogate: 1,1,2-trichloro-1,2,2-trifluoroethane (Fi	0.0847		116%	90-120	"	"	"
Surrogate: 1,1,1-Trichloroethane	3.90E-3	J	78%	80-120	"	"	"
Surrogate: Carbon tetrachloride	0.0926		108%	80-120	"	"	"

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## **Chicago Regional Laboratory**

536 South Clark Street, Chicago, IL 60605 Phone:(312)353-8370 Fax:(312)886-2591

Air Division, US EPA Region 5 Project: BP Whiting Refinery

77 West Jackson Boulevard Project Number: [none] Reported:
Chicago IL, 60605 Project Manager: Motria Caudill Jan-21-15 11:50

# Air Toxics by GC/MS, EPA TO-15 (modified) US EPA Region 5 Chicago Regional Laboratory

2 (1410020-04RE1) Air Sampled: Oct-16-14 10:30 Received: Oct-16-14 11:00

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
Acetone	3.84	J		0.250	ppbv	5	B410068	Oct-16-14	Oct-16-14

2 (1410020-05) Air Sampled: Oct-16-14 10:30 Received: Oct-16-14 11:00

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
Propene	1.65	K		0.0500	ppbv	1	B410068	Oct-16-14	Oct-16-14
Chloromethane	0.518			0.0250	"	"	"	"	"
Vinyl chloride	$\mathbf{U}$			0.0250	"	"	"	"	"
1,3-butadiene	0.0423	K		0.0250	"	"	"	"	"
Bromomethane	$\mathbf{U}$			0.0250	"	"	"	"	"
Chloroethane	U			0.0250	"	"	"	"	"
Ethanol	1.35	J		0.0250	"	"	"	"	"
Acrolein	0.583	J, K		0.0250	"	"	"	"	"
Isopropyl alcohol	0.348	J		0.0250	"	"	"	"	"
1,1-Dichloroethene	U			0.0250	"	"	"	"	"
Methylene chloride	0.104			0.0250	"	"	"	"	"
Carbon disulfide	Rejected			0.0250	"	"	"	"	"
Methyl tert-butyl ether	U			0.0250	"	"	"	"	"
,1-Dichloroethane	U			0.0250	"	"	"	"	"
Vinyl acetate	U			0.0250	"	"	"	"	"
Hexane	0.357			0.0250	"	"	"	"	"
2-Butanone	0.340			0.0500	"	"	"	"	"
cis-1,2-Dichloroethene	U			0.0250	"	"	"	"	"
rans-1,2-Dichloroethene	U			0.0250	"	"	"	"	"
Chloroform	0.0319			0.0250	"	"	"	"	"
Ethyl acetate	0.125			0.0250	"	"	"	"	"
1,2-Dichloroethane	U			0.0250	"	"	"	"	"
Cyclohexane	0.334			0.0500	"	"	"	"	"
Tetrahydrofuran	U			0.0250	"	"	"	"	"
Benzene	0.284			0.0250	"	"	"	"	"
1-Heptane	0.191			0.0250	"	"	"	"	"
,2-Dichloropropane	U			0.0250	"	"	"	"	"
<b>Frichloroethene</b>	U			0.0250	"	"	"	"	"
Bromodichloromethane	U			0.0250	"	"	"	"	"
Methyl methacrylate	U			0.0250	"	"	"	"	"



#### **Environmental Protection Agency Region 5**

## **Chicago Regional Laboratory**

536 South Clark Street, Chicago, IL 60605 Phone:(312)353-8370 Fax:(312)886-2591

Project: BP Whiting Refinery

77 West Jackson Boulevard Project Number: [none] Reported:
Chicago IL, 60605 Project Manager: Motria Caudill Jan-21-15 11:50

# Air Toxics by GC/MS, EPA TO-15 (modified) US EPA Region 5 Chicago Regional Laboratory

2 (1410020-05) Air Sampled: Oct-16-14 10:30 Received: Oct-16-14 11:00

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
1,4-Dioxane	U			0.0250	ppbv	1	B410068	Oct-16-14	Oct-16-14
cis-1,3-Dichloropropene	U			0.0250	"	"	"	"	"
4-Methyl-2-pentanone	0.0378	K		0.0250	"	"	"	"	"
trans-1,3-Dichloropropene	U			0.0250	"	"	"	"	"
1,1,2-Trichloroethane	U			0.0250	"	"	"	"	"
Dibromochloromethane	U			0.0250	"	"	"	"	"
Toluene	0.514			0.0250	"	"	"	"	"
2-Hexanone	0.0284			0.0250	"	"	"	"	"
1,2-Dibromoethane (EDB)	U			0.0250	"	"	"	"	"
Tetrachloroethene	U			0.0250	"	"	"	"	"
Chlorobenzene	U			0.0250	"	"	"	"	"
Ethylbenzene	0.0751			0.0250	"	"	"	"	"
m+p-Xylene	0.241			0.0500	"	"	"	"	"
Bromoform	U			0.0250	"	"	"	"	"
Styrene	0.0267			0.0250	"	"	"	"	"
1,1,2,2-Tetrachloroethane	U			0.0250	"	"	"	"	"
o-Xylene	0.0920			0.0250	"	"	"	"	"
4-ethyltoluene	0.0735	K		0.0250	"	"	"	"	"
1,3,5-Trimethylbenzene	U			0.0250	"	"	"	"	"
1,2,4-Trimethylbenzene	0.0705			0.0250	"	"	"	"	"
1,3-Dichlorobenzene	U			0.0250	"	"	"	"	"
Benzyl chloride	U			0.0250	"	"	"	"	"
1,4-Dichlorobenzene	U			0.0250	"	"	"	"	"
1,2-Dichlorobenzene	U			0.0250	"	"	"	"	"
Hexachlorobutadiene	U			0.0250	"	"	"	"	"
1,2,4-Trichlorobenzene	U			0.0250	"	"	"	"	"
Naphthalene	0.675	J		0.0250	"	"	"	"	"
Surogate	Result			%REC		%REC Limits	Batch	Prepared	Analyzed
Surrogate: Dichlorodifluoromethane	0.454	J		87%		90-120	"	"	"
Surrogate: Dichlorotetrafluoroethane	0.0234	J		117%		80-120	"	"	"
Surrogate: Trichlorofluoromethane	0.227			95%		90-120	"	"	"
Surrogate: 1,1,2-trichloro-1,2,2-trifluoroethane (Fi	0.0849			116%		90-120	"	"	"
Surrogate: 1,1,1-Trichloroethane	3.79E-3	J		76%		80-120	"	"	"
Surrogate: Carbon tetrachloride	0.0912	•		106%		80-120	"	"	"
Sm. ogare. Caroon ten demonde	0.0712			100/0		00 120			

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## **Chicago Regional Laboratory**

536 South Clark Street, Chicago, IL 60605 Phone:(312)353-8370 Fax:(312)886-2591

Air Division, US EPA Region 5 Project: BP Whiting Refinery

77 West Jackson BoulevardProject Number: [none]Reported:Chicago IL, 60605Project Manager: Motria CaudillJan-21-15 11:50

# Air Toxics by GC/MS, EPA TO-15 (modified) US EPA Region 5 Chicago Regional Laboratory

2 (1410020-05RE1) Air Sampled: Oct-16-14 10:30 Received: Oct-16-14 11:00

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
Acetone	3.25	J		0.250	ppbv	5	B410068	Oct-16-14	Oct-16-14

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## **Chicago Regional Laboratory**

536 South Clark Street, Chicago, IL 60605 Phone:(312)353-8370 Fax:(312)886-2591

Air Division, US EPA Region 5 Project: BP Whiting Refinery

77 West Jackson Boulevard Project Number: [none] Reported:
Chicago IL, 60605 Project Manager: Motria Caudill Jan-21-15 11:50

## Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control US EPA Region 5 Chicago Regional Laboratory

#### **Batch B410068 - ColdTrap Dehydration**

Blank (B410068-BLK1)	Prepared & Analyzed: Oct-16-14										
		Flags /		Reporting		Spike	Source		%REC		RPD
Analyte	Result	Qualifiers	MDL	Limit	Units	Level	Result	%REC	Limits	RPD	Limit
Propene	0.0712			0.0500	ppbv						
Chloromethane	$\mathbf{U}$			0.0250	"						
Vinyl chloride	U			0.0250	"						
1,3-butadiene	$\mathbf{U}$			0.0250	"						
Bromomethane	$\mathbf{U}$			0.0250	"						
Chloroethane	$\mathbf{U}$			0.0250	"						
Ethanol	0.165	J		0.0250	"						
Acrolein	$\mathbf{U}$	J		0.0250	"						
Isopropyl alcohol	$\mathbf{U}$	J		0.0250	"						
Acetone	0.0971	J		0.0500	"						
1,1-Dichloroethene	U			0.0250	"						
Methylene chloride	U			0.0250	"						
Carbon disulfide	Rejected			0.0250	"						
Methyl tert-butyl ether	U			0.0250	"						
1,1-Dichloroethane	U			0.0250	"						
Vinyl acetate	U			0.0250	"						
Hexane	U			0.0250	"						
2-Butanone	U			0.0500	"						
cis-1,2-Dichloroethene	U			0.0250	"						
trans-1,2-Dichloroethene	U			0.0250	"						
Chloroform	$\mathbf{U}$			0.0250	"						
Ethyl acetate	U			0.0250	"						
1,2-Dichloroethane	U			0.0250	"						
Cyclohexane	U			0.0500	"						
Tetrahydrofuran	U			0.0250	"						
Benzene	U			0.0250	"						
n-Heptane	U			0.0250	"						
1,2-Dichloropropane	U			0.0250	"						
Trichloroethene	U			0.0250	"						
Bromodichloromethane	U			0.0250	"						
Methyl methacrylate	U			0.0250	"						
1,4-Dioxane	U			0.0250	"						
cis-1,3-Dichloropropene	$\mathbf{U}$			0.0250	"						



## **Chicago Regional Laboratory**

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Air Division, US EPA Region 5 Project: BP Whiting Refinery

77 West Jackson Boulevard Project Number: [none] Reported:
Chicago IL, 60605 Project Manager: Motria Caudill Jan-21-15 11:50

## Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control US EPA Region 5 Chicago Regional Laboratory

**Batch B410068 - ColdTrap Dehydration** 

Blank (B410068-BLK1)	Prepared & Analyzed: Oct-16-14												
		Flags /		Reporting		Spike	Source		%REC		RPD		
Analyte	Result	Qualifiers	MDL	Limit	Units	Level	Result	%REC	Limits	RPD	Limit		
4-Methyl-2-pentanone	U			0.0250	ppbv								
trans-1,3-Dichloropropene	U			0.0250	"								
1,1,2-Trichloroethane	U			0.0250	"								
Dibromochloromethane	U			0.0250	"								
Toluene	0.0418			0.0250	"								
2-Hexanone	U			0.0250	"								
1,2-Dibromoethane (EDB)	U			0.0250	"								
Tetrachloroethene	U			0.0250	"								
Chlorobenzene	U			0.0250	"								
Ethylbenzene	U			0.0250	"								
m+p-Xylene	U			0.0500	"								
Bromoform	U			0.0250	"								
Styrene	U			0.0250	"								
1,1,2,2-Tetrachloroethane	U			0.0250	"								
o-Xylene	U			0.0250	"								
4-ethyltoluene	U			0.0250	"								
1,3,5-Trimethylbenzene	U			0.0250	"								
1,2,4-Trimethylbenzene	U			0.0250	"								
1,3-Dichlorobenzene	U			0.0250	"								
Benzyl chloride	U			0.0250	"								
1,4-Dichlorobenzene	U			0.0250	"								
1,2-Dichlorobenzene	U			0.0250	"								
Hexachlorobutadiene	U			0.0250	"								
1,2,4-Trichlorobenzene	U			0.0250	"								
Naphthalene	0.108	J		0.0250	"								
Surrogate: Dichlorodifluoromethane	U	J			"	0.5250		1%	90-120				
Surrogate: Dichlorotetrafluoroethane	U				"	2.000E-2		%	80-120				
Surrogate: Trichlorofluoromethane	U				"	0.2390		%	90-120				
Surrogate:	U				"	7.300E-2		%	90-120				
1,1,2-trichloro-1,2,2-trifluoroethane (Freon													
Surrogate: 1,1,1-Trichloroethane	U				"	5.000E-3		%	80-120				
Surrogate: Carbon tetrachloride	U				"	8.600E-2		%	80-120				



## **Chicago Regional Laboratory**

536 South Clark Street, Chicago, IL 60605 Phone:(312)353-8370 Fax:(312)886-2591

Air Division, US EPA Region 5 Project: BP Whiting Refinery

77 West Jackson Boulevard Project Number: [none] Reported:
Chicago IL, 60605 Project Manager: Motria Caudill Jan-21-15 11:50

## Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control US EPA Region 5 Chicago Regional Laboratory

**Batch B410068 - ColdTrap Dehydration** 

	LCS (B410068-BS1)		Prepared & Analyzed: Oct-16-14											
Propose			-		Reporting		Spike	Source		%REC		RPD		
Chioromethane	Analyte	Result	Qualifiers	MDL	Limit	Units	Level	Result	%REC	Limits	RPD	Limit		
Vinyl chloride         0.511         0.0250         0.5000         162%         77.4117           1.3-butadiene         0.488         0.0250         0.5000         18%         77.7115           Bromomethane         0.522         0.0250         0.5000         101%         798.114           Ethanol         0.751         J         0.0250         0.5000         16%         50-124           Acrolein         0.322         J         0.0250         0.5000         16%         679-130           Isopropyl alcohol         0.500         J         0.0250         0.5000         16%         679-130           Acetone         0.956         J         0.0250         0.5000         16%         679-130           Li-Dichloroethene         0.543         0.0250         0.5000         169%         77.3-118           Methyl terchbutyl ether         0.512         0.0250         0.5000         169%         77.3-118           Methyl terchbutyl ether         0.512         0.0250         0.5000         169%         79.118           Li-Dichloroethane         0.516         0.0250         0.5000         169%         79.8-117           Vinyl acetate         0.545         0.0250         0.5000 <th>Propene</th> <th>0.484</th> <th></th> <th></th> <th>0.0500</th> <th>ppbv</th> <th>0.5000</th> <th></th> <th>97%</th> <th>76-112</th> <th></th> <th></th>	Propene	0.484			0.0500	ppbv	0.5000		97%	76-112				
1.3-butadiene   0.488   0.0250   " 0.5000   98%   77.7-115     Bromomethane   0.522   0.0250   " 0.5000   104%   75.2-117     Chlorocthane   0.504   0.0250   " 0.5000   104%   75.2-117     Chlorocthane   0.751   J 0.0250   " 0.5000   159%   598-114     Chlorocthane   0.822   J 0.0250   " 0.5000   164%   67.9-130     Isopropialacholo   0.500   J 0.0250   " 0.5000   164%   66-137     Isopropialacholo   0.500   J 0.0250   " 0.5000   169%   66-137     I.1-Dichlorocthene   0.543   0.0250   " 0.5000   169%   77.3-118     Methylene chloride   0.528   0.0250   " 0.5000   169%   77.3-118     Methylene chloride   0.528   0.0250   " 0.5000   169%   77.3-118     Methylene chloride   0.512   0.0250   " 0.5000   169%   78.3-117     Carbon disulfide   0.512   0.0250   " 0.5000   169%   78.3-117     I.1-Dichlorocthane   0.516   0.0250   " 0.5000   169%   79.3-118     I.1-Dichlorocthane   0.516   0.0250   " 0.5000   169%   79.3-118     I.1-Dichlorocthane   0.516   0.0250   " 0.5000   169%   79.3-117     I.1-Dichlorocthane   0.545   0.0250   " 0.5000   169%   79.3-117     I.1-Dichlorocthane   0.547   0.0250   " 0.5000   169%   79.3-115     I.1-Dichlorocthene   0.537   0.0250   " 0.5000   169%   79.3-115     I.1-Dichlorocthene   0.537   0.0250   " 0.5000   169%   79.3-115     I.1-Dichlorocthene   0.527   0.0250   " 0.5000   169%   79.3-115     I.1-Dichlorocthane   0.527   0.0250   " 0.5000   169%   79.3-115     I.1-Dic	Chloromethane	0.505			0.0250	"	0.5000		101%	77.6-116				
Bromomethane	Vinyl chloride	0.511			0.0250	"	0.5000		102%	77.4-117				
Chlorocthane	1,3-butadiene	0.488			0.0250	"	0.5000		98%	77.7-115				
Ethanol 0.751 J 0.0250 " 0.5000 150% 50-124  Acrolein 0.822 J 0.0250 " 0.5000 160% 679-130  Isopropyl alcohol 0.500 J 0.0500 " 0.5000 100% 81-106  Acrotene 0.956 J 0.0250 " 0.5000 109% 77.3-118  Methylene chloride 0.528 0.0250 " 0.5000 106% 78.7-117  Carbon disulfide Rejected 0.0250 " 0.5000 102% 79.1-118  Li-1-Dichlorothane 0.516 0.0250 " 0.5000 102% 79.1-118  Li-1-Dichlorothane 0.546 0.0250 " 0.5000 109% 85-106  Hexane 0.494 0.0250 " 0.5000 109% 85-106  Hexane 0.594 0.0500 " 0.5000 109% 85-106  Chloroform 0.527 0.0250 " 0.5000 109% 79.1-115  trans-I,2-Dichlorothene 0.535 0.0250 " 0.5000 107% 78.1-115  trans-I,2-Dichlorothane 0.555 0.0250 " 0.5000 107% 79.6-115  Ethyl acetate 0.555 0.0250 " 0.5000 107% 79.6-115  Ethyl acetate 0.555 0.0250 " 0.5000 105% 79.6-115  Cyclohexane 0.557 0.0250 " 0.5000 105% 79.6-115  Cyclohexane 0.557 0.0250 " 0.5000 105% 79.8-115  Cyclohexane 0.557 0.0250 " 0.5000 105% 79.8-115  Cyclohexane 0.557 0.0250 " 0.5000 105% 79.8-115  Tetrahydrofuran 0.527 0.0250 " 0.5000 105% 79.8-115  Tetrahydrofuran 0.527 0.0250 " 0.5000 105% 79.8-115  Tetrahydrofuran 0.520 0.0500 105% 79.8-115  Tetrahydrofuran 0.520 0.0500 100% 70.1-119  Bromodichloromethane 0.540 0.0500 " 0.5000 100% 70.1-119	Bromomethane	0.522			0.0250	"	0.5000		104%	75.2-117				
Acrolein         0.822         J         0.0250         "         0.5000         164%         67.9-130           Isopropyl alcohol         0.500         J         0.0250         "         0.5000         191%         66-137           Acetone         0.956         J         0.0500         "         0.5000         191%         66-137           IDichloroethene         0.543         J         0.0250         "         0.5000         199%         66-137           Methylene chloride         0.528         J         0.0250         "         0.5000         106%         78.7-117           Carbon disulfide         Rejected         J         0.0250         "         0.5000         103%         79.1-118           Methyl tert-butyl ether         0.512         J         0.0250         "         0.5000         103%         79.8-117           Vinyl acetate         0.516         J         0.0250         "         0.5000         103%         79.8-117           Usual Lectate         0.545         J         0.0250         "         0.5000         107%         78.1-115           Ethyl acetate         0.537         J         0.0250         "         0.5000         107% <th>Chloroethane</th> <th>0.504</th> <th></th> <th></th> <th>0.0250</th> <th>"</th> <th>0.5000</th> <th></th> <th>101%</th> <th>79.8-114</th> <th></th> <th></th>	Chloroethane	0.504			0.0250	"	0.5000		101%	79.8-114				
Sepropy  alcohol	Ethanol	0.751	J		0.0250	"	0.5000		150%	50-124				
Acetone 0.956 J 0.0500 " 0.5000 191% 60-137 1.1-Dichloroethene 0.543 0.0250 " 0.5000 190% 77.3-118 Methylene chloride 0.528 0.0250 " 0.5000 106% 78.7-117 Carbon disulfide Rejected 0.0250 " 0.5000 106% 78.7-117 Carbon disulfide Rejected 0.0250 " 0.5000 106% 79.1-118 1.1-Dichloroethane 0.512 0.0250 " 0.5000 102% 79.1-118 1.1-Dichloroethane 0.516 0.0250 " 0.5000 103% 79.8-117 Vinyl acetate 0.545 0.0250 " 0.5000 103% 79.8-117 Vinyl acetate 0.545 0.0250 " 0.5000 103% 85-106 103% 79.8-117 Vinyl acetate 0.545 0.0250 " 0.5000 103% 83-106 103% 79.8-117 Vinyl acetate 0.537 0.0250 " 0.5000 103% 79.8-115 Uinyl acetate 0.538 0.0250 " 0.5000 103% 79.8-115 Uinyl acetate 0.555 0.0250 " 0.5000 103% 79.8-115 Uinyl acetate 0.556 0.0250 " 0.5000 103% 79.8-115 Uinyl acetate 0.557 0.0250 " 0.5000 103% 79.8-115 Uinyl acetate 0.557 0.0250 " 0.5000 103% 79.8-115 Uinyl acetate 0.557 0.0250 " 0.5000 103% 75.5-118 Uinyl acetate 0.557 0.0250 " 0.5000 103% 75.5-	Acrolein	0.822	J		0.0250	"	0.5000		164%	67.9-130				
	Isopropyl alcohol	0.500	J		0.0250	"	0.5000		100%	81-106				
Methylene chloride  0.528  0.0250  0.0250  0.0500  0.0	Acetone	0.956	J		0.0500	"	0.5000		191%	60-137				
Carbon disulfide         Rejected         0.0250         0.5000         203%         53-140           Methyl tert-butyl ether         0.512         0.0250         "         0.5000         102%         79.1-118           1,1-Dichloroethane         0.516         0.0250         "         0.5000         103%         79.8-117           Vinyl acetate         0.545         0.0250         "         0.5000         199%         85-106           Hexane         0.494         0.0250         "         0.5000         99%         70.1-121           2-Butanone         0.560         0.0500         "         0.5000         107%         78.1-115           trans-1,2-Dichloroethene         0.537         0.0250         "         0.5000         107%         78.1-115           trans-1,2-Dichloroethene         0.537         0.0250         "         0.5000         107%         79.6-115           Ethyl acetate         0.537         0.0250         "         0.5000         105%         79.6-115           Ethyl acetate         0.554         0.0250         "         0.5000         111%         72.5-119           Cyclohexane         0.554         0.0250         "         0.5000         111%	1,1-Dichloroethene	0.543			0.0250	"	0.5000		109%	77.3-118				
Methyl tert-butyl ether  0.512 0.0250 0.0250 0.0250 0.0500	Methylene chloride	0.528			0.0250	"	0.5000		106%	78.7-117				
	Carbon disulfide	Rejected			0.0250	"	0.5000		203%	53-140				
No.	Methyl tert-butyl ether	0.512			0.0250	"	0.5000		102%	79.1-118				
Hexane	1,1-Dichloroethane	0.516			0.0250	"	0.5000		103%	79.8-117				
2-Butanone	Vinyl acetate	0.545			0.0250	"	0.5000		109%	85-106				
1.2-Dichloroethene	Hexane	0.494			0.0250	"	0.5000		99%	70.1-121				
trans-1,2-Dichloroethene         0.535         0.0250         "         0.5000         107%         0-200           Chloroform         0.527         0.0250         "         0.5000         105%         79.6-115           Ethyl acetate         0.5555         0.0250         "         0.5000         111%         0-200           1,2-Dichloroethane         0.525         0.0250         "         0.5000         115%         79.8-115           Cyclohexane         0.554         0.0500         "         0.5000         111%         72.5-119           Tetrahydrofuran         0.527         0.0250         "         0.5000         105%         0-200           Benzene         0.557         0.0250         "         0.5000         111%         75.7-118           n-Heptane         0.498         0.0250         "         0.5000         100%         66.9-152           1,2-Dichloropropane         0.502         0.0250         "         0.5000         104%         76.8-118           Trichloroethene         0.502         0.0250         "         0.5000         109%         75.8-117           Methyl methacrylate         0.529         0.0250         "         0.5000         106%	2-Butanone	0.560			0.0500	"	0.5000		112%	82-108				
Chloroform         0.527         0.0250         "         0.5000         105%         79.6-115           Ethyl acetate         0.555         0.0250         "         0.5000         111%         0-200           1,2-Dichloroethane         0.525         0.0250         "         0.5000         105%         79.8-115           Cyclohexane         0.554         0.0500         "         0.5000         111%         72.5-119           Tetrahydrofuran         0.527         0.0250         "         0.5000         105%         0-200           Benzene         0.557         0.0250         "         0.5000         111%         75.7-118           n-Heptane         0.498         0.0250         "         0.5000         100%         66.9-152           1,2-Dichloropropane         0.520         0.0250         "         0.5000         104%         76.8-118           Trichloroethene         0.502         0.0250         "         0.5000         109%         75.8-117           Methyl methacrylate         0.529         0.0250         "         0.5000         106%         0-200           1,4-Dioxane         0.506         0.0250         "         0.5000         101%         54.7-	cis-1,2-Dichloroethene	0.537			0.0250	"	0.5000		107%	78.1-115				
Ethyl acetate         0.555         0.0250         " 0.5000         111%         0-200           1,2-Dichloroethane         0.525         0.0250         " 0.5000         105%         79.8-115           Cyclohexane         0.554         0.0500         " 0.5000         111%         72.5-119           Tetrahydrofuran         0.527         0.0250         " 0.5000         105%         0-200           Benzene         0.557         0.0250         " 0.5000         111%         75.7-118           n-Heptane         0.498         0.0250         " 0.5000         100%         66.9-152           1,2-Dichloropropane         0.520         0.0250         " 0.5000         104%         76.8-118           Trichloroethene         0.502         0.0250         " 0.5000         100%         70.1-119           Bromodichloromethane         0.547         0.0250         " 0.5000         109%         75.8-117           Methyl methacrylate         0.529         0.0250         " 0.5000         101%         54.7-150           cis-1,3-Dichloropropene         0.583         0.0250         " 0.5000         117%         75.5-115	trans-1,2-Dichloroethene	0.535			0.0250	"	0.5000		107%	0-200				
1,2-Dichloroethane       0.525       0.0250       " 0.5000       105%       79.8-115         Cyclohexane       0.554       0.0500       " 0.5000       111%       72.5-119         Tetrahydrofuran       0.527       0.0250       " 0.5000       105%       0-200         Benzene       0.557       0.0250       " 0.5000       111%       75.7-118         n-Heptane       0.498       0.0250       " 0.5000       100%       66.9-152         1,2-Dichloropropane       0.520       0.0250       " 0.5000       104%       76.8-118         Trichloroethene       0.502       0.0250       " 0.5000       100%       70.1-119         Bromodichloromethane       0.547       0.0250       " 0.5000       109%       75.8-117         Methyl methacrylate       0.529       0.0250       " 0.5000       106%       0-200         1,4-Dioxane       0.506       0.0250       " 0.5000       101%       54.7-150         cis-1,3-Dichloropropene       0.583       0.0250       " 0.5000       117%       75.5-115	Chloroform	0.527			0.0250	"	0.5000		105%	79.6-115				
Cyclohexane         0.554         0.0500         "         0.5000         111%         72.5-119           Tetrahydrofuran         0.527         0.0250         "         0.5000         105%         0-200           Benzene         0.557         0.0250         "         0.5000         111%         75.7-118           n-Heptane         0.498         0.0250         "         0.5000         100%         66.9-152           1,2-Dichloropropane         0.520         0.0250         "         0.5000         104%         76.8-118           Trichloroethene         0.502         0.0250         "         0.5000         100%         70.1-119           Bromodichloromethane         0.547         0.0250         "         0.5000         109%         75.8-117           Methyl methacrylate         0.529         0.0250         "         0.5000         106%         0-200           1,4-Dioxane         0.506         0.0250         "         0.5000         101%         54.7-150           cis-1,3-Dichloropropene         0.583         0.0250         "         0.5000         117%         75.5-115	Ethyl acetate	0.555			0.0250	"	0.5000		111%	0-200				
Tetrahydrofuran         0.527         0.0250         "         0.5000         105%         0-200           Benzene         0.557         0.0250         "         0.5000         111%         75.7-118           n-Heptane         0.498         0.0250         "         0.5000         100%         66.9-152           1,2-Dichloropropane         0.520         0.0250         "         0.5000         104%         76.8-118           Trichloroethene         0.502         0.0250         "         0.5000         100%         70.1-119           Bromodichloromethane         0.547         0.0250         "         0.5000         109%         75.8-117           Methyl methacrylate         0.529         0.0250         "         0.5000         106%         0-200           1,4-Dioxane         0.506         0.0250         "         0.5000         101%         54.7-150           cis-1,3-Dichloropropene         0.583         0.0250         "         0.5000         117%         75.5-115	1,2-Dichloroethane	0.525			0.0250	"	0.5000		105%	79.8-115				
Benzene         0.557         0.0250         "         0.5000         111%         75.7-118           n-Heptane         0.498         0.0250         "         0.5000         100%         66.9-152           1,2-Dichloropropane         0.520         0.0250         "         0.5000         104%         76.8-118           Trichloroethene         0.502         0.0250         "         0.5000         100%         70.1-119           Bromodichloromethane         0.547         0.0250         "         0.5000         109%         75.8-117           Methyl methacrylate         0.529         0.0250         "         0.5000         106%         0-200           1,4-Dioxane         0.506         0.0250         "         0.5000         101%         54.7-150           cis-1,3-Dichloropropene         0.583         0.0250         "         0.5000         117%         75.5-115	Cyclohexane	0.554			0.0500	"	0.5000		111%	72.5-119				
n-Heptane 0.498 0.0250 " 0.5000 100% 66.9-152  1,2-Dichloropropane 0.520 0.0250 " 0.5000 104% 76.8-118  Trichloroethene 0.502 0.0250 " 0.5000 100% 70.1-119  Bromodichloromethane 0.547 0.0250 " 0.5000 109% 75.8-117  Methyl methacrylate 0.529 0.0250 " 0.5000 106% 0-200  1,4-Dioxane 0.506 0.0250 " 0.5000 101% 54.7-150  cis-1,3-Dichloropropene 0.583 0.0250 " 0.5000 117% 75.5-115	Tetrahydrofuran	0.527			0.0250	"	0.5000		105%	0-200				
1,2-Dichloropropane       0.520       0.0250       0.5000       104%       76.8-118         Trichloroethene       0.502       0.0250       0.5000       100%       70.1-119         Bromodichloromethane       0.547       0.0250       0.5000       109%       75.8-117         Methyl methacrylate       0.529       0.0250       0.5000       106%       0-200         1,4-Dioxane       0.506       0.0250       0.5000       101%       54.7-150         cis-1,3-Dichloropropene       0.583       0.0250       0.5000       117%       75.5-115	Benzene	0.557			0.0250	"	0.5000		111%	75.7-118				
Trichloroethene         0.502         0.0250         0.5000         100%         70.1-119           Bromodichloromethane         0.547         0.0250         0.5000         109%         75.8-117           Methyl methacrylate         0.529         0.0250         0.5000         106%         0-200           1,4-Dioxane         0.506         0.0250         0.5000         101%         54.7-150           cis-1,3-Dichloropropene         0.583         0.0250         0.5000         117%         75.5-115	n-Heptane	0.498			0.0250	"	0.5000		100%	66.9-152				
Bromodichloromethane         0.547         0.0250         "         0.5000         109%         75.8-117           Methyl methacrylate         0.529         0.0250         "         0.5000         106%         0-200           1,4-Dioxane         0.506         0.0250         "         0.5000         101%         54.7-150           cis-1,3-Dichloropropene         0.583         0.0250         "         0.5000         117%         75.5-115	1,2-Dichloropropane	0.520			0.0250	"	0.5000		104%	76.8-118				
Methyl methacrylate         0.529         0.0250         "         0.5000         106%         0-200           1,4-Dioxane         0.506         0.0250         "         0.5000         101%         54.7-150           cis-1,3-Dichloropropene         0.583         0.0250         "         0.5000         117%         75.5-115	Trichloroethene	0.502			0.0250	"	0.5000		100%	70.1-119				
1,4-Dioxane       0.506       0.0250       0.5000       101%       54.7-150         cis-1,3-Dichloropropene       0.583       0.0250       0.5000       117%       75.5-115	Bromodichloromethane	0.547			0.0250	"	0.5000		109%	75.8-117				
cis-1,3-Dichloropropene 0.583 0.0250 " 0.5000 117% 75.5-115	Methyl methacrylate	0.529			0.0250	"	0.5000		106%	0-200				
• •	1,4-Dioxane	0.506			0.0250	"	0.5000		101%	54.7-150				
<b>4-Methyl-2-pentanone</b> 0.501 0.0250 " 0.5000 100% 62.9-133	cis-1,3-Dichloropropene	0.583			0.0250	"	0.5000		117%	75.5-115				
	4-Methyl-2-pentanone	0.501			0.0250	"	0.5000		100%	62.9-133				

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## **Chicago Regional Laboratory**

536 South Clark Street, Chicago, IL 60605 Phone:(312)353-8370 Fax:(312)886-2591

Air Division, US EPA Region 5 Project: BP Whiting Refinery

77 West Jackson Boulevard Project Number: [none] Reported:
Chicago IL, 60605 Project Manager: Motria Caudill Jan-21-15 11:50

## Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control US EPA Region 5 Chicago Regional Laboratory

**Batch B410068 - ColdTrap Dehydration** 

LCS (B410068-BS1)	Prepared & Analyzed: Oct-16-14										
		Flags /		Reporting		Spike	Source		%REC		RPD
Analyte	Result	Qualifiers	MDL	Limit	Units	Level	Result	%REC	Limits	RPD	Limit
trans-1,3-Dichloropropene	0.553			0.0250	ppbv	0.5000		111%	75.8-117		
1,1,2-Trichloroethane	0.514			0.0250	"	0.5000		103%	92.3-106		
Dibromochloromethane	0.564			0.0250	"	0.5000		113%	69-132		
Toluene	0.577			0.0250	"	0.5000		115%	73.2-120		
2-Hexanone	0.538			0.0250	"	0.5000		108%	76-110		
1,2-Dibromoethane (EDB)	0.553			0.0250	"	0.5000		111%	75.5-118		
Tetrachloroethene	0.523			0.0250	"	0.5000		105%	67.1-125		
Chlorobenzene	0.522			0.0250	"	0.5000		104%	68.5-121		
Ethylbenzene	0.494			0.0250	"	0.5000		99%	74.9-118		
m+p-Xylene	0.987			0.0500	"	1.000		99%	79.8-121		
Bromoform	0.509			0.0250	"	0.5000		102%	72.4-119		
Styrene	0.440			0.0250	"	0.5000		88%	71.5-122		
1,1,2,2-Tetrachloroethane	0.508			0.0250	"	0.5000		102%	92-106		
o-Xylene	0.489			0.0250	"	0.5000		98%	77.6-124		
4-ethyltoluene	0.484			0.0250	"	0.5000		97%	96.7-122		
1,3,5-Trimethylbenzene	0.470			0.0250	"	0.5000		94%	74.4-121		
1,2,4-Trimethylbenzene	0.480			0.0250	"	0.5000		96%	71.9-126		
1,3-Dichlorobenzene	0.492			0.0250	"	0.5000		98%	67.9-132		
Benzyl chloride	0.536			0.0250	"	0.5000		107%	60.7-134		
1,4-Dichlorobenzene	0.487			0.0250	"	0.5000		97%	65.4-136		
1,2-Dichlorobenzene	0.508			0.0250	"	0.5000		102%	69.3-129		
Hexachlorobutadiene	0.554			0.0250	"	0.5000		111%	8.45-161		
1,2,4-Trichlorobenzene	0.623			0.0250	"	0.5000		125%	39.7-186		
Naphthalene	0.852	J		0.0250	"				40-200		
Surrogate: Dichlorodifluoromethane	0.485				"	0.5000		97%	77.8-116		
Surrogate: Dichlorotetrafluoroethane	0.472				"	0.5000		94%	89-108		
Surrogate: Trichlorofluoromethane	0.520				"	0.5000		104%	78.6-114		
Surrogate: 1,1,2-trichloro-1,2,2-trifluoroethane (Freon	0.502				"	0.5000		100%	75.3-119		
Surrogate: 1,1,1-Trichloroethane	0.532				"	0.5000		106%	92.5-105		
Surrogate: Carbon tetrachloride	0.542				"	0.5000		108%	76.3-118		

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## **Chicago Regional Laboratory**

536 South Clark Street, Chicago, IL 60605 Phone:(312)353-8370 Fax:(312)886-2591

Project: BP Whiting Refinery

77 West Jackson Boulevard Project Number: [none] Reported:
Chicago IL, 60605 Project Manager: Motria Caudill Jan-21-15 11:50

## Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control US EPA Region 5 Chicago Regional Laboratory

**Batch B410068 - ColdTrap Dehydration** 

Propone 0.370 0.0500 ppbv 0.5000 74% 76-112 27 19.6 Chloromethane 0.488 0.0250 " 0.5000 98% 77.6-116 3 26.9 19.6 Chloromethane 0.488 0.0250 " 0.5000 98% 77.6-116 3 26.9 19.6 Chloromethane 0.410 0.0250 " 0.5000 92% 77.7-115 17 33.2 25.1 1.3-butadiene 0.410 0.0250 " 0.5000 92% 77.7-115 17 33.2 25.1 1.3-butadiene 0.410 0.0250 " 0.5000 92% 77.7-115 17 33.2 25.1 1.3-butadiene 0.416 0.0250 " 0.5000 91% 75.2-117 3 2.2-12 25.1 1.3-butadiene 0.485 0.0250 " 0.5000 91% 75.2-117 3 2.2-12 25.1 1.3-butadiene 0.485 0.0250 " 0.5000 91% 75.2-117 3 2.2-12 25.1 1.3-butadiene 0.485 0.0250 " 0.5000 91% 75.2-117 3 2.2-12 25.1 1.3-butadiene 0.485 0.0250 " 0.5000 91% 75.2-117 3 2.2-12 25.1 1.3-butadiene 0.464 J 0.0250 " 0.5000 91% 75.2-117 3 2.2-12 25.1 1.3-butadiene 0.446 J 0.0250 " 0.5000 91% 75.2-117 0.2-12 25.1 1.3-butadiene 0.446 J 0.0250 " 0.5000 91% 75.3-118 7 1.5-9 0.2-12 1.3-butadiene 0.508 0.250 " 0.5000 91% 75.3-118 7 1.5-9 0.2-12 1.3-butadiene 0.508 0.250 " 0.5000 91% 75.3-118 7 1.5-9 0.2-12 1.3-butadiene 0.508 0.250 " 0.5000 91% 75.3-118 7 1.5-9 0.2-12 1.3-butadiene 0.508 0.250 " 0.5000 91% 75.3-118 7 1.5-9 0.2-12 1.3-butadiene 0.508 0.250 " 0.5000 91% 75.3-118 7 1.5-9 0.2-12 1.3-butadiene 0.508 0.250 " 0.5000 91% 75.3-10 44 2.000 0.250 " 0.5000	LCS Dup (B410068-BSD1)	Prepared & Analyzed: Oct-16-14											
Propose												RPD	
Chloromethane         0.488         0.0250         0.5000         98%         7.6-116         3         2.92           Vinyl choride         0.462         0.0250         0.5000         92%         77.4-117         10         2.51           Bromomethane         0.566         0.0250         0.5000         101%         75.2-117         3         2.66           Chlorocthane         0.885         0.0250         0.5000         101%         75.2-117         3         2.66           Ethanol         0.652         J         0.0250         0.5000         130%         50-124         4         2.95           Ethanol         0.471         J         0.0250         0.5000         149%         67.9-130         10         2.98           Isopropyl alcohol         0.471         J         0.0250         0.5000         217%         60-137         13         2.87           Actone         1.90         J         0.0500         0.5000         105%         78.7-117         0.5         2.27           Actone         1.90         J         0.0500         0.5000         105%         78.7-11         0.5         2.27           Li-Dicklorocthane         6.526         0.0250<	Analyte	Result	Qualifiers	MDL	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	
Vinyl chloride	Propene	0.370			0.0500	ppbv	0.5000		74%	76-112	27	19.6	
	Chloromethane	0.488			0.0250	"	0.5000		98%	77.6-116	3	26.9	
Bromomethane	Vinyl chloride	0.462			0.0250	"	0.5000		92%	77.4-117	10	25.1	
Chlorocthane	1,3-butadiene	0.410			0.0250	"	0.5000		82%	77.7-115	17	33.2	
Ethanol         0.652         J         0.0250         "         0.5000         130%         50-124         14         200           Acrolein         0.746         J         0.0250         "         0.5000         149%         679-130         10         29.8           Isopropyl alcohol         0.471         J         0.0250         "         0.5000         24%         81-106         6         25           Acetone         1.09         J         0.0500         "         0.5000         127%         60-137         13         28.7           Li-Dichlorothene         0.588          0.0250         "         0.5000         105%         77.3-118         7         15.9           Methylene chloride         0.526          0.0250         "         0.5000         130%         53-140         44         200           Methyl tert-butyl ether         0.467          0.0250         "         0.5000         101%         79.8-118         9         31.9           Li-Dichlorothane         0.566          0.0250         "         0.5000         93%         70-121         6         43.5           2-Butanon         0.613	Bromomethane	0.506			0.0250	"	0.5000		101%	75.2-117	3	26.6	
Acrolein	Chloroethane	0.485			0.0250	"	0.5000		97%	79.8-114	4	29.5	
Sepropy   alcohol	Ethanol	0.652	J		0.0250	"	0.5000		130%	50-124	14	200	
Acetome	Acrolein	0.746	J		0.0250	"	0.5000		149%	67.9-130	10	29.8	
	Isopropyl alcohol	0.471	J		0.0250	"	0.5000		94%	81-106	6	25	
Methylene chloride  0.526  0.0250  0.0250  0.0500  0.0	Acetone	1.09	J		0.0500	"	0.5000		217%	60-137	13	28.7	
Carbon disulfide         Rejected         0.0250         0.5000         130%         5.3-140         44         200           Methyl tert-butyl ether         0.467         0.0250         "         0.5000         93%         79.1-118         9         31.9           1,1-Dichloroethane         0.506         0.0250         "         0.5000         101%         79.8-117         2         13.1           Vinyl acetate         0.480         0.0250         "         0.5000         93%         70.1-121         6         43.5           2-Butanne         0.464         0.0250         "         0.5000         93%         70.1-121         6         43.5           2-Butanne         0.613         0.0500         "         0.5000         102%         82.108         9         25           cis-1,2-Dichloroethene         0.510         0.0250         "         0.5000         102%         78.1-115         5         29.6           Chloroform         0.558         0.0250         "         0.5000         112%         79.6-115         6         25.2           Ethyl acetate         0.524         0.0250         "         0.5000         115%         79.8-115         6         24.6	1,1-Dichloroethene	0.508			0.0250	"	0.5000		102%	77.3-118	7	15.9	
Methyl tert-butyl ether	Methylene chloride	0.526			0.0250	"	0.5000		105%	78.7-117	0.5	20.7	
1,1-Dichloroethane   0,506   0,0250   " 0,5000   0,0	Carbon disulfide	Rejected			0.0250	"	0.5000		130%	53-140	44	200	
No.	Methyl tert-butyl ether	0.467			0.0250	"	0.5000		93%	79.1-118	9	31.9	
Hexane	1,1-Dichloroethane	0.506			0.0250	"	0.5000		101%	79.8-117	2	13.1	
2-Butanone	Vinyl acetate	0.480			0.0250	"	0.5000		96%	85-106	13	200	
Company   Comp	Hexane	0.464			0.0250	"	0.5000		93%	70.1-121	6	43.5	
trans-1,2-Dichloroethene  0.512  0.0250  " 0.5000  102%  0-200  4 25  Chloroform  0.558  0.0250  " 0.5000  112%  79.6-115  6 25.2  Ethyl acetate  0.524  0.0250  " 0.5000  105%  0-200  6 25  1,2-Dichloroethane  0.555  0.0250  " 0.5000  111%  79.8-115  6 24.6  Cyclohexane  0.552  0.0500  " 0.5000  110%  72.5-119  0.3 34.5  Tetrahydrofuran  0.526  0.0250  " 0.5000  105%  0-200  0.2 25  Benzene  0.555  0.0250  " 0.5000  111%  75.7-118  0.4 27.4  n-Heptane  0.486  0.0250  " 0.5000  111%  75.7-118  0.4 27.4  n-Heptane  0.546  0.0250  " 0.5000  115%  76.8-118  10 25.3  Trichloroethene  0.540  0.0250  " 0.5000  115%  76.8-118  10 25.3  Trichloroethene  0.540  0.0250  " 0.5000  108%  70.1-119  7 34.1  Bromodichloromethane  0.608  0.0250  " 0.5000  108%  75.8-117  11 26.5  Methyl methacrylate  0.540  0.0250  " 0.5000  108%  54.7-150  6 58.6  cis-1,3-Dichloropropene  0.591	2-Butanone	0.613			0.0500	"	0.5000		123%	82-108	9	25	
Chloroform  0.558  0.0250  0.0250  0.5000  112%  79.6-115  6  25.2  Ethyl acetate  0.524  0.0250  0.0250  0.5000  111%  79.8-115  6  24.6  Cyclohexane  0.555  0.0250  0.0500  110%  72.5-119  0.3  34.5  Tetrahydrofuran  0.556  0.0250  0.0250  0.5000  110%  72.5-119  0.3  34.5  Tetrahydrofuran  0.555  0.0250  0.0250  0.05000  111%  75.7-118  0.4  27.4  n-Heptane  0.486  0.0250  0.0250  0.5000  111%  75.7-118  0.4  27.4  n-Heptane  0.577  0.0250  0.5000  115%  76.8-118  10  25.3  Trichloroethene  0.540  0.0250  0.0250  0.5000  118%  70.1-119  7  34.1  Bromodichloromethane  0.608  0.0250  0.0250  0.5000  108%  70.1-119  7  34.1  Bromodichloromethane  0.543  0.0250  0.0250  0.5000  108%  70.1-119  7  34.1  26.5  Methyl methacrylate  0.540  0.0250  0.0250  0.5000  108%  54.7-150  6  58.6  cis-1,3-Dichloropropene  0.591  0.0250  0.0250  0.05000  118%  75.5-115  1  31.1	cis-1,2-Dichloroethene	0.510			0.0250	"	0.5000		102%	78.1-115	5	29.6	
Ethyl acetate         0.524         0.0250         " 0.5000         105%         0.200         6         25           1,2-Dichloroethane         0.555         0.0250         " 0.5000         111%         79.8-115         6         24.6           Cyclohexane         0.552         0.0500         " 0.5000         110%         72.5-119         0.3         34.5           Tetrahydrofuran         0.526         0.0250         " 0.5000         105%         0-200         0.2         25           Benzene         0.555         0.0250         " 0.5000         111%         75.7-118         0.4         27.4           n-Heptane         0.486         0.0250         " 0.5000         97%         66.9-152         3         25           1,2-Dichloropropane         0.577         0.0250         " 0.5000         115%         76.8-118         10         25.3           Trichloroethene         0.540         0.0250         " 0.5000         108%         70.1-119         7         34.1           Bromodichloromethane         0.608         0.0250         " 0.5000         108%         75.8-117         11         26.5           Methyl methacrylate         0.540         0.0250         0.5000         10	trans-1,2-Dichloroethene	0.512			0.0250	"	0.5000		102%	0-200	4	25	
1,2-Dichloroethane       0.555       0.0250       " 0.5000       111%       79.8-115       6       24.6         Cyclohexane       0.552       0.0500       " 0.5000       110%       72.5-119       0.3       34.5         Tetrahydrofuran       0.526       0.0250       " 0.5000       105%       0-200       0.2       25         Benzene       0.555       0.0250       " 0.5000       111%       75.7-118       0.4       27.4         n-Heptane       0.486       0.0250       " 0.5000       97%       66.9-152       3       25         1,2-Dichloropropane       0.577       0.0250       " 0.5000       115%       76.8-118       10       25.3         Trichloroethene       0.540       0.0250       " 0.5000       108%       70.1-119       7       34.1         Bromodichloromethane       0.608       0.0250       " 0.5000       122%       75.8-117       11       26.5         Methyl methacrylate       0.540       0.0250       " 0.5000       108%       54.7-150       6       58.6         cis-1,3-Dichloropropene       0.591       0.0250       " 0.5000       118%       75.5-115       1       31.1	Chloroform	0.558			0.0250	"	0.5000		112%	79.6-115	6	25.2	
Cyclohexane         0.552         0.0500         "         0.5000         110%         72.5-119         0.3         34.5           Tetrahydrofuran         0.526         0.0250         "         0.5000         105%         0-200         0.2         25           Benzene         0.555         0.0250         "         0.5000         111%         75.7-118         0.4         27.4           n-Heptane         0.486         0.0250         "         0.5000         97%         66.9-152         3         25           1,2-Dichloropropane         0.577         0.0250         "         0.5000         115%         76.8-118         10         25.3           Trichloroethene         0.540         0.0250         "         0.5000         108%         70.1-119         7         34.1           Bromodichloromethane         0.608         0.0250         "         0.5000         108%         70.1-119         7         34.1           Methyl methacrylate         0.543         0.0250         "         0.5000         108%         54.7-150         6         58.6           cis-1,3-Dichloropropene         0.591         0.0250         "         0.5000         118%         75.5-115         1<	Ethyl acetate	0.524			0.0250	"	0.5000		105%	0-200	6	25	
Ceyclolickance         0.532         0.0000         0.5000         105%         0-200         0.2         25           Benzene         0.555         0.0250         0.5000         111%         75.7-118         0.4         27.4           n-Heptane         0.486         0.0250         0.5000         97%         66.9-152         3         25           1,2-Dichloropropane         0.577         0.0250         0.5000         115%         76.8-118         10         25.3           Trichloroethene         0.540         0.0250         0.5000         108%         70.1-119         7         34.1           Bromodichloromethane         0.608         0.0250         0.5000         122%         75.8-117         11         26.5           Methyl methacrylate         0.543         0.0250         0.5000         109%         0-200         3         200           1,4-Dioxane         0.540         0.0250         0.5000         118%         54.7-150         6         58.6           cis-1,3-Dichloropropene         0.591         0.0250         0.5000         118%         75.5-115         1         31.1	1,2-Dichloroethane	0.555			0.0250	"	0.5000		111%	79.8-115	6	24.6	
Benzene         0.555         0.0250         "         0.5000         111%         75.7-118         0.4         27.4           n-Heptane         0.486         0.0250         "         0.5000         97%         66.9-152         3         25           1,2-Dichloropropane         0.577         0.0250         "         0.5000         115%         76.8-118         10         25.3           Trichloroethene         0.540         0.0250         "         0.5000         108%         70.1-119         7         34.1           Bromodichloromethane         0.608         0.0250         "         0.5000         122%         75.8-117         11         26.5           Methyl methacrylate         0.543         0.0250         "         0.5000         109%         0-200         3         200           1,4-Dioxane         0.540         0.0250         "         0.5000         118%         54.7-150         6         58.6           cis-1,3-Dichloropropene         0.591         0.0250         "         0.5000         118%         75.5-115         1         31.1	Cyclohexane	0.552			0.0500	"	0.5000		110%	72.5-119	0.3	34.5	
n-Heptane 0.486 0.0250 " 0.5000 97% 66.9-152 3 25 1,2-Dichloropropane 0.577 0.0250 " 0.5000 115% 76.8-118 10 25.3 Trichloroethene 0.540 0.0250 " 0.5000 108% 70.1-119 7 34.1 Bromodichloromethane 0.608 0.0250 " 0.5000 122% 75.8-117 11 26.5 Methyl methacrylate 0.543 0.0250 " 0.5000 109% 0-200 3 200 1,4-Dioxane 0.540 0.0250 " 0.5000 108% 54.7-150 6 58.6 cis-1,3-Dichloropropene 0.591 0.0250 " 0.5000 118% 75.5-115 1 31.1	Tetrahydrofuran	0.526			0.0250	"	0.5000		105%	0-200	0.2	25	
1,2-Dichloropropane         0.577         0.0250         "         0.5000         115%         76.8-118         10         25.3           Trichloroethene         0.540         0.0250         "         0.5000         108%         70.1-119         7         34.1           Bromodichloromethane         0.608         0.0250         "         0.5000         122%         75.8-117         11         26.5           Methyl methacrylate         0.543         0.0250         "         0.5000         109%         0-200         3         200           1,4-Dioxane         0.540         0.0250         "         0.5000         108%         54.7-150         6         58.6           cis-1,3-Dichloropropene         0.591         0.0250         "         0.5000         118%         75.5-115         1         31.1	Benzene	0.555			0.0250	"	0.5000		111%	75.7-118	0.4	27.4	
Trichloroethene         0.540         0.0250         " 0.5000         108%         70.1-119         7         34.1           Bromodichloromethane         0.608         0.0250         " 0.5000         122%         75.8-117         11         26.5           Methyl methacrylate         0.543         0.0250         " 0.5000         109%         0-200         3         200           1,4-Dioxane         0.540         0.0250         " 0.5000         108%         54.7-150         6         58.6           cis-1,3-Dichloropropene         0.591         0.0250         " 0.5000         118%         75.5-115         1         31.1	n-Heptane	0.486			0.0250	"	0.5000		97%	66.9-152	3	25	
Bromodichloromethane         0.608         0.0250         "         0.5000         122%         75.8-117         11         26.5           Methyl methacrylate         0.543         0.0250         "         0.5000         109%         0-200         3         200           1,4-Dioxane         0.540         0.0250         "         0.5000         108%         54.7-150         6         58.6           cis-1,3-Dichloropropene         0.591         0.0250         "         0.5000         118%         75.5-115         1         31.1	1,2-Dichloropropane	0.577			0.0250	"	0.5000		115%	76.8-118	10	25.3	
Methyl methacrylate         0.543         0.0250         " 0.5000         109%         0-200         3         200           1,4-Dioxane         0.540         0.0250         " 0.5000         108%         54.7-150         6         58.6           cis-1,3-Dichloropropene         0.591         0.0250         " 0.5000         118%         75.5-115         1         31.1	Trichloroethene	0.540			0.0250	"	0.5000		108%	70.1-119	7	34.1	
1,4-Dioxane     0.540     0.0250     0.5000     108%     54.7-150     6     58.6       cis-1,3-Dichloropropene     0.591     0.0250     0.5000     118%     75.5-115     1     31.1	Bromodichloromethane	0.608			0.0250	"	0.5000		122%	75.8-117	11	26.5	
cis-1,3-Dichloropropene 0.591 0.0250 " 0.5000 118% 75.5-115 1 31.1	Methyl methacrylate	0.543			0.0250	"	0.5000		109%	0-200	3	200	
	1,4-Dioxane	0.540			0.0250	"	0.5000		108%	54.7-150	6	58.6	
<b>4-Methyl-2-pentanone 0.487</b> 0.0250 " 0.5000 97% 62.9-133 3 42	cis-1,3-Dichloropropene	0.591			0.0250	"	0.5000		118%	75.5-115	1	31.1	
	4-Methyl-2-pentanone	0.487			0.0250	"	0.5000		97%	62.9-133	3	42	

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## **Chicago Regional Laboratory**

536 South Clark Street, Chicago, IL 60605 Phone:(312)353-8370 Fax:(312)886-2591

Air Division, US EPA Region 5 Project: BP Whiting Refinery

77 West Jackson Boulevard Reported: Project Number: [none] Chicago IL, 60605 Project Manager: Motria Caudill Jan-21-15 11:50

### Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control **US EPA Region 5 Chicago Regional Laboratory**

**Batch B410068 - ColdTrap Dehydration** 

LCS Dup (B410068-BSD1)	Prepared & Analyzed: Oct-16-14										
		Flags /		Reporting		Spike	Source		%REC		RPD
Analyte	Result	Qualifiers	MDL	Limit	Units	Level	Result	%REC	Limits	RPD	Limit
trans-1,3-Dichloropropene	0.567			0.0250	ppbv	0.5000		113%	75.8-117	2	31.7
1,1,2-Trichloroethane	0.570			0.0250	"	0.5000		114%	92.3-106	10	11.5
Dibromochloromethane	0.627			0.0250	"	0.5000		125%	69-132	10	25
Toluene	0.567			0.0250	"	0.5000		113%	73.2-120	2	30.6
2-Hexanone	0.525			0.0250	"	0.5000		105%	76-110	2	46.8
1,2-Dibromoethane (EDB)	0.594			0.0250	"	0.5000		119%	75.5-118	7	31.5
Tetrachloroethene	0.572			0.0250	"	0.5000		114%	67.1-125	9	13.8
Chlorobenzene	0.539			0.0250	"	0.5000		108%	68.5-121	3	31.9
Ethylbenzene	0.499			0.0250	"	0.5000		100%	74.9-118	1	31.6
m+p-Xylene	0.984			0.0500	"	1.000		98%	79.8-121	0.3	28.9
Bromoform	0.556			0.0250	"	0.5000		111%	72.4-119	9	34.6
Styrene	0.481			0.0250	"	0.5000		96%	71.5-122	9	19.7
1,1,2,2-Tetrachloroethane	0.568			0.0250	"	0.5000		114%	92-106	11	11.5
o-Xylene	0.491			0.0250	"	0.5000		98%	77.6-124	0.3	28.7
4-ethyltoluene	0.482			0.0250	"	0.5000		96%	96.7-122	0.5	25
1,3,5-Trimethylbenzene	0.468			0.0250	"	0.5000		94%	74.4-121	0.4	29.8
1,2,4-Trimethylbenzene	0.479			0.0250	"	0.5000		96%	71.9-126	0.4	32.1
1,3-Dichlorobenzene	0.520			0.0250	"	0.5000		104%	67.9-132	5	37.9
Benzyl chloride	0.513			0.0250	"	0.5000		103%	60.7-134	4	48.3
1,4-Dichlorobenzene	0.519			0.0250	"	0.5000		104%	65.4-136	6	39.6
1,2-Dichlorobenzene	0.528			0.0250	"	0.5000		106%	69.3-129	4	34
Hexachlorobutadiene	0.596			0.0250	"	0.5000		119%	8.45-161	7	25
1,2,4-Trichlorobenzene	0.565			0.0250	"	0.5000		113%	39.7-186	10	77.1
Naphthalene	0.651	J		0.0250	"				40-200	27	200
Surrogate: Dichlorodifluoromethane	0.480				"	0.5000		96%	77.8-116		
Surrogate: Dichlorotetrafluoroethane	0.473				"	0.5000		95%	89-108		
Surrogate: Trichlorofluoromethane	0.512				"	0.5000		102%	78.6-114		
Surrogate:	0.495				"	0.5000		99%	75.3-119		
1,1,2-trichloro-1,2,2-trifluoroethane (Freon	0.560				"	0.5000		1120/	02.5.105		
Surrogate: 1,1,1-Trichloroethane Surrogate: Carbon tetrachloride	0.574				"	0.5000		112%	92.5-105		
surrogate. Carbon tetracnioriae	0.5/4					0.5000		115%	76.3-118		

Page 21 of 24 Report Name: 1410020 FINAL Jan 21 15 1150



### **Environmental Protection Agency Region 5**

## **Chicago Regional Laboratory**

536 South Clark Street, Chicago, IL 60605 Phone:(312)353-8370 Fax:(312)886-2591

Project: BP Whiting Refinery

77 West Jackson Boulevard Project Number: [none] Reported:
Chicago IL, 60605 Project Manager: Motria Caudill Jan-21-15 11:50

## Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control US EPA Region 5 Chicago Regional Laboratory

**Batch B410068 - ColdTrap Dehydration** 

Flags		
Propene 0.337 K 0.050 ppby 1.08  Chloromethane 0.536 0.0250 " 0.532  Vinyl chloride U 0.0250 " 0.0406  Bromomethane 7.52E-3 0.0250 " 0.0406  Chlorothane 9.95E-3 0.0250 " 0.0406  Chlorothane 9.95E-3 0.0250 " 0.0506  Chlorothane 9.95E-3 0.0250 " 0.0506  Chlorothane 0.475 J, K 0.0250 " 0.516  Sopropyl alcohol 3.62 J 0.0250 " 0.516  Sopropyl alcohol 3.62 J 0.0250 " 0.516  Li-Dichlorothane U 0.0250 " 0.0516  Carbon disulfide Rejected 0.129 BC 0.0250 " 0.0306  Carbon disulfide Rejected 0.0250 " 0.0307  Chlorothane U 0.0250 " 0.0307  Chlorothane 0.331 0.0350 " 0.03		RPD
Chloromethane         0.536         0.0250         "         0.532           Vinyl chloride         U         0.0250         "         0.0406           Bromomethane         7.52E-3         0.0250         "         0.0406           Bromomethane         7.52E-3         0.0250         "         0.0406           Chloroethane         9.95E-3         0.0250         "         7.57E-3           Chloroethane         9.95E-3         J. K         0.0250         "         0.516           Isopropyl alcohol         3.62         J. K         0.0250         "         0.516           Isopropyl alcohol         3.62         J. K         0.0250         "         0.516           Isopropyl alcohol         3.62         J. W         0.0250         "         0.516           Isopropyl alcohol         3.62         J. W         0.0250         "         0.516           Isopropyl alcohol         3.62         J. W         0.0250         "         U           Methyl chridene         U         0.0250         "         U           Methyl chridene         U         0.0250         "         U           U, J.1-Dichloroethane         U         0.0250	RPD	Limit
Clinyl chloride         U         0.0250         "         0.0406           1.3-butadiene         0.0412         K         0.0250         "         0.0406           Bromomethane         7.52E-3         0.0250         "         7.57E-3           Chloroethane         9.95E-3         0.0250         "         7.69E-3           Ethanol         1.15         J         0.0250         "         1.36           Acrolein         0.475         J. K         0.0250         "         0.516           Isopropyl alcohol         3.62         J         0.0250         "         0.516           Acctone         2.64         J         0.0250         "         0.516           Isopropyl alcohol         3.62         J         0.0250         "         0.516           Acctone         2.64         J         0.0250         "         U           Methylene chloride         0.129         BC         0.0250         "         U           Methylene chloride         Rejected         0.0250         "         U           Methylene chloride         Rejected         0.0250         "         U           Methylene chloride         Rejected         0.0250<	14	30
1.3-butadiene         0.0412         K         0.0250         "         0.0406           Bromomethane         7.52E-3         0.0250         "         7.57E-3           Chloroethane         9.95E-3         0.0250         "         7.69E-3           Ethanol         1.15         J         0.0250         "         1.36           Acrolein         0.475         J, K         0.0250         "         0.516           Isopropyl alcohol         3.62         J         0.0250         "         0.516           Acctone         2.64         J         0.0500         "         2.86           1,1-Dichloroethane         U         0.0250         "         U           Methyl terr-butyl ether         U         0.0250         "         U           Methyl terr-butyl ether         U         0.0250         "         U           I,1-Dichloroethane         U         0.0250         "         U           Methyl terr-butyl ether         U         0.0250         "         U           I,1-Dichloroethane         U         0.0250         "         U           Hexane         0.284         0.0250         "         0.307 <t< th=""><th>0.7</th><th>30</th></t<>	0.7	30
Bromomethane         7.52E.3         0.0250         *         7.57E-3           Chloroethane         9.95E.3         0.0250         *         7.69E-3           Ethanol         1.15         J         0.0250         *         1.36           Acrolein         0.475         J, K         0.0250         *         0.516           Isopropyl alcohol         3.62         J         0.0250         *         0.516           Acctone         2.64         J         0.0500         *         2.86           1,1-Dichloroethane         U         0.0250         *         U           Methylene chloride         Rejected         0.0250         *         0.134           Carbon disulfide         Rejected         0.0250         *         0.134           Methyl tert-butyl ether         U         0.0250         *         U           1,1-Dichloroethane         U         0.0250         *         U           Vinyl acetate         U         0.0250         *         U           Hexane         0.284         0.0250         *         U           Ebutanone         0.331         0.050         *         0.339           cis-1,2-Dichloroethane<		30
Chloroethane         9.95E-3         0.0250         " 7.69E-3           Ethanol         1.15         J         0.0250         " 0.516           Acrolein         0.475         J, K         0.0250         " 0.516           Isopropyl alcohol         3.62         J         0.0250         " 2.86           Acetone         2.64         J         0.0500         " 2.86           1,1-Dichloroethene         U         0.0250         " 0.134           Methylene chloride         0.129         BC         0.0250         " 0.134           Carbon disulfide         Rejected         0.0250         " 0.034         U           Methyl tert-butyl ether         U         0.0250         " 0.0250         U           I,1-Dichloroethane         U         0.0250         " 0.0250         U           Vinyl acetate         U         0.0250         " 0.307         1.5E-3           Hexane         0.284         0.0250         " 0.307         2.030           2-Butanone         0.331         0.0250         " 0.030         U           trans-1,2-Dichloroethene         U         0.0250         " 0.0250         0.0268           Ethyl acetate         0.158         0.0250	2	30
Ethanol         1.15         J         0.0250         "         1.36           Acrolein         0.475         J. K         0.0250         "         0.516           Isopropyl alcohol         3.62         J         0.0250         "         3.85           Acetone         2.64         J         0.0500         "         2.86           1,1-Dichloroethene         U         0.0250         "         U           Methylene chloride         0.129         BC         0.0250         "         0.134           Carbon disulfide         Rejected         0.0250         "         0.134           Methyl tert-butyl ether         U         0.0250         "         U           1,1-Dichloroethane         U         0.0250         "         U           Vinyl acetate         U         0.0250         "         U           Usane         0.284         0.0250         "         0.307           2-Butanone         0.331         0.0500         "         0.339           vis-1,2-Dichloroethene         U         0.0250         "         0.96E-3           Chloroform         0.0364         0.0250         "         0.0258           Eth	0.7	30
Acrolein         0.475         J. K         0.0250         "         0.516           Isopropyl alcohol         3.62         J         0.0250         "         3.85           Acetone         2.64         J         0.0500         "         2.86           1,1-Dichloroethene         U         0.0250         "         U           Methylene chloride         0.129         BC         0.0250         "         0.134           Carbon disulfide         Rejected         0.0250         "         0.134           Carbon disulfide         Rejected         0.0250         "         0.134           Carbon disulfide         Rejected         0.0250         "         U           Methyl tert-butyl ether         U         0.0250         "         U           Methyl tert-butyl ether         U         0.0250         "         U           Vinyl acetate         U         0.0250         "         U           Vinyl acetate         U         0.0250         "         0.337           cis-1,2-Dichloroethene         U         0.0250         "         U           Chloroform         0.0364         0.0250         "         0.0268	26	30
Isopropyl alcohol   3.62	17	40
Acetone         2.64         J         0.0500         "         2.86           1,1-Dichloroethene         U         0.0250         "         U           Methylene chloride         0.129         BC         0.0250         "         0.134           Carbon disulfide         Rejected         0.0250         "         Rejected           Methyl tert-butyl ether         U         0.0250         "         U           1,1-Dichloroethane         U         0.0250         "         U           Vinyl acetate         U         0.0250         "         9.15E-3           Hexane         0.284         0.0250         "         0.307           2-Butanone         0.331         0.0500         "         0.339           cis-1,2-Dichloroethene         U         0.0250         "         U           trans-1,2-Dichloroethene         5.89E-3         0.0250         "         0.0268           Ethyl acetate         0.158         0.0250         "         0.157           1,2-Dichloroethane         0.0123         0.0250         "         0.0110           Cyclohexane         0.222         0.0500         "         0.195           Tetrahydrofuran	8	40
I,1-Dichloroethene         U         0.0250         "         U           Methylene chloride         0.129         BC         0.0250         "         0.134           Carbon disulfide         Rejected         0.0250         "         Rejected           Methyl tert-butyl ether         U         0.0250         "         U           I,1-Dichloroethane         U         0.0250         "         U           Vinyl acetate         U         0.0250         "         0.307           Hexane         0.284         0.0250         "         0.339           cis-1,2-Dichloroethene         U         0.0250         "         U           trans-1,2-Dichloroethene         U         0.0250         "         0.0268           Ethyl acetate         0.158         0.0250         "         0.0268           Ethyl acetate         0.158         0.0250         "         0.0110           Cyclohexane         0.222         0.0500         "         0.0110           Cyclohexane         0.236         "         0.0150         U           Etrahydrofuran         U         0.0250         "         0.235           Ferrahydrofuran         0.134         0	6	40
Methylene chloride         0.129         BC         0.0250         "         0.134           Carbon disulfide         Rejected         0.0250         "         Rejected           Methyl tert-butyl ether         U         0.0250         "         U           1,1-Dichloroethane         U         0.0250         "         U           Vinyl acetate         U         0.0250         "         0.307           2-Butanone         0.331         0.0500         "         0.339           cis-1,2-Dichloroethene         U         0.0250         "         U           trans-1,2-Dichloroethene         U         0.0250         "         U           Chloroform         0.0364         0.0250         "         0.0268           Ethyl acetate         0.158         0.0250         "         0.157           1,2-Dichloroethane         0.0123         0.0250         "         0.0110           Cyclohexane         0.222         0.0500         "         0.195           Tetrahydrofuran         U         0.0250         "         0.235           Benzene         0.230         0.0250         "         0.235           Heydrofuran         0.134 <th< th=""><th>8</th><th>40</th></th<>	8	40
Carbon disulfide         Rejected         0.0250         "         Rejected           Methyl tert-butyl ether         U         0.0250         "         U           1,1-Dichloroethane         U         0.0250         "         U           Vinyl acetate         U         0.0250         "         0.307           2-Butanone         0.284         0.0250         "         0.307           2-Butanone         0.331         0.0500         "         0.339           cis-1,2-Dichloroethene         U         0.0250         "         U           trans-1,2-Dichloroethene         5.89E-3         0.0250         "         6.96E-3           Chloroform         0.0364         0.0250         "         0.0268           Ethyl acetate         0.158         0.0250         "         0.0157           1,2-Dichloroethane         0.0123         0.0250         "         0.0110           Cyclohexane         0.222         0.0500         "         0.195           Tetrahydrofuran         U         0.0250         "         U           Benzene         0.230         0.0250         "         0.235           n-Heptane         0.134         0.0250		30
Methyl tert-butyl ether         U         0.0250         "         U           1,1-Dichloroethane         U         0.0250         "         U           Vinyl acetate         U         0.0250         "         9.15E-3           Hexane         0.284         0.0250         "         0.307           2-Butanone         0.331         0.0500         "         0.339           cis-1,2-Dichloroethene         U         0.0250         "         U           trans-1,2-Dichloroethene         5.89E-3         0.0250         "         6.96E-3           Chloroform         0.0364         0.0250         "         0.0268           Ethyl acetate         0.158         0.0250         "         0.0110           Cyclohexane         0.0123         0.0250         "         0.0110           Cyclohexane         0.222         0.0500         "         0.195           Tetrahydrofuran         U         0.0250         "         0.235           n-Heptane         0.134         0.0250         "         0.235	4	30
1,1-Dichloroethane         U         0.0250         "         U           Vinyl acetate         U         0.0250         "         9.15E-3           Hexane         0.284         0.0250         "         0.307           2-Butanone         0.331         0.0500         "         0.339           cis-1,2-Dichloroethene         U         0.0250         "         U           Chloroform         0.0364         0.0250         "         6.96E-3           Ethyl acetate         0.158         0.0250         "         0.157           1,2-Dichloroethane         0.0123         0.0250         "         0.0110           Cyclohexane         0.222         0.0500         "         0.195           Tetrahydrofuran         U         0.0250         "         U           Benzene         0.230         0.0250         "         0.235           n-Heptane         0.134         0.0250         "         0.136	0.1	40
Vinyl acetate         U         0.0250         "         9.15E-3           Hexane         0.284         0.0250         "         0.307           2-Butanone         0.331         0.0500         "         0.339           cis-1,2-Dichloroethene         U         0.0250         "         U           trans-1,2-Dichloroethene         5.89E-3         0.0250         "         6.96E-3           Chloroform         0.0364         0.0250         "         0.0268           Ethyl acetate         0.158         0.0250         "         0.0110           Cyclohexane         0.222         0.0500         "         0.195           Tetrahydrofuran         U         0.0250         "         U           Benzene         0.230         0.0250         "         0.235           n-Heptane         0.134         0.0250         "         0.136		40
Hexane         0.284         0.0250         "         0.307           2-Butanone         0.331         0.0500         "         0.339           cis-1,2-Dichloroethene         U         0.0250         "         U           trans-1,2-Dichloroethene         5.89E-3         0.0250         "         6.96E-3           Chloroform         0.0364         0.0250         "         0.0268           Ethyl acetate         0.158         0.0250         "         0.157           1,2-Dichloroethane         0.0123         0.0250         "         0.0110           Cyclohexane         0.222         0.0500         "         U           Benzene         0.230         0.0250         "         U           Benzene         0.230         0.0250         "         0.235           n-Heptane         0.134         0.0250         "         0.136		30
2-Butanone 0,331 0.0500 " 0.339 cis-1,2-Dichloroethene U 0.0250 " U trans-1,2-Dichloroethene 5.89E-3 0.0250 " 0.0268 Ethyl acetate 0.158 0.0250 " 0.0157 1,2-Dichloroethane 0.0123 0.0250 " 0.0110 Cyclohexane 0.222 0.0500 " 0.0250 " 0.195 Tetrahydrofuran U 0.0250 " 0.0250 " 0.195 Tetrahydrofuran O.0250 " 0.0250 " 0.195 Tetrahydrofuran O.0250 " 0.0250		40
2-Bitainne         0.551         0.0350         0.339           cis-1,2-Dichloroethene         U         0.0250         "         U           trans-1,2-Dichloroethene         5.89E-3         0.0250         "         6.96E-3           Chloroform         0.0364         0.0250         "         0.0268           Ethyl acetate         0.158         0.0250         "         0.0117           1,2-Dichloroethane         0.0123         0.0250         "         0.0110           Cyclohexane         0.222         0.0500         "         0.195           Tetrahydrofuran         U         0.0250         "         U           Benzene         0.230         0.0250         "         0.235           n-Heptane         0.134         0.0250         "         0.136	8	30
trans-1,2-Dichloroethene         5.89E-3         0.0250         "         6.96E-3           Chloroform         0.0364         0.0250         "         0.0268           Ethyl acetate         0.158         0.0250         "         0.0157           1,2-Dichloroethane         0.0123         0.0250         "         0.0110           Cyclohexane         0.222         0.0500         "         0.195           Tetrahydrofuran         U         0.0250         "         U           Benzene         0.230         0.0250         "         0.235           n-Heptane         0.134         0.0250         "         0.136	3	50
Chloroform       0.0364       0.0250       "       0.0268         Ethyl acetate       0.158       0.0250       "       0.157         1,2-Dichloroethane       0.0123       0.0250       "       0.0110         Cyclohexane       0.222       0.0500       "       0.195         Tetrahydrofuran       U       0.0250       "       U         Benzene       0.230       0.0250       "       0.235         n-Heptane       0.134       0.0250       "       0.136		30
Ethyl acetate         0.158         0.0250         "         0.157           1,2-Dichloroethane         0.0123         0.0250         "         0.0110           Cyclohexane         0.222         0.0500         "         0.195           Tetrahydrofuran         U         0.0250         "         U           Benzene         0.230         0.0250         "         0.235           n-Heptane         0.134         0.0250         "         0.136	17	30
1,2-Dichloroethane       0.0123       0.0250       "       0.0110         Cyclohexane       0.222       0.0500       "       0.195         Tetrahydrofuran       U       0.0250       "       U         Benzene       0.230       0.0250       "       0.235         n-Heptane       0.134       0.0250       "       0.136	30	30
Cyclohexane         0.222         0.0500         "         0.195           Tetrahydrofuran         U         0.0250         "         U           Benzene         0.230         0.0250         "         0.235           n-Heptane         0.134         0.0250         "         0.136	0.6	40
Tetrahydrofuran         U         0.0250         "         U           Benzene         0.230         0.0250         "         0.235           n-Heptane         0.134         0.0250         "         0.136	11	30
Benzene       0.230       0.0250       "       0.235         n-Heptane       0.134       0.0250       "       0.136	13	30
n-Heptane 0.134 0.0250 " 0.136		40
n-ireptanc 0.134 0.0250 0.150	2	30
<b>1,2-Dichloropropane</b> U 0.0250 " U	2	30
		30
Trichloroethene U 0.0250 " U		30
Bromodichloromethane U 0.0250 " U		30
Methyl methacrylate U 0.0250 " U		40
<b>1,4-Dioxane 0.0153</b> 0.0250 " U		40
cis-1,3-Dichloropropene U 0.0250 " U		30
<b>4-Methyl-2-pentanone 0.0330</b> K 0.0250 " 0.0420	24	40



## **Chicago Regional Laboratory**

536 South Clark Street, Chicago, IL 60605 Phone:(312)353-8370 Fax:(312)886-2591

Air Division, US EPA Region 5 Project: BP Whiting Refinery

77 West Jackson Boulevard Project Number: [none] Reported:
Chicago IL, 60605 Project Manager: Motria Caudill Jan-21-15 11:50

## Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control US EPA Region 5 Chicago Regional Laboratory

**Batch B410068 - ColdTrap Dehydration** 

Duplicate (B410068-DUP1)	Source: 1410020-01		Prepared & Analyzed: Oct-16-14								
		Flags /		Reporting		Spike	Source		%REC		RPD
Analyte	Result	Qualifiers	MDL	Limit	Units	Level	Result	%REC	Limits	RPD	Limit
trans-1,3-Dichloropropene	U			0.0250	ppbv		U				30
1,1,2-Trichloroethane	U			0.0250	"		U				30
Dibromochloromethane	U			0.0250	"		U				30
Toluene	0.438			0.0250	"		0.450			3	30
2-Hexanone	U			0.0250	"		U				40
1,2-Dibromoethane (EDB)	U			0.0250	"		U				30
Tetrachloroethene	0.0142			0.0250	"		0.0146			3	30
Chlorobenzene	U			0.0250	"		U				30
Ethylbenzene	0.0494			0.0250	"		0.0528			7	30
m+p-Xylene	0.162	BC		0.0500	"		0.162			0.2	30
Bromoform	U			0.0250	"		U				30
Styrene	0.0290			0.0250	"		0.0256			13	30
1,1,2,2-Tetrachloroethane	U			0.0250	"		U				30
o-Xylene	0.0592			0.0250	"		0.0604			2	30
4-ethyltoluene	0.0559	K		0.0250	"		0.0558			0.2	30
1,3,5-Trimethylbenzene	0.0163			0.0250	"		0.0160			2	30
1,2,4-Trimethylbenzene	0.0534			0.0250	"		0.0529			0.9	30
1,3-Dichlorobenzene	U			0.0250	"		U				30
Benzyl chloride	U			0.0250	"		U				30
1,4-Dichlorobenzene	U			0.0250	"		U				30
1,2-Dichlorobenzene	U			0.0250	"		U				30
Hexachlorobutadiene	U			0.0250	"		U				30
1,2,4-Trichlorobenzene	U			0.0250	"		U				30
Naphthalene	0.648	BC, J		0.0250	"		0.622			4	30
Surrogate: Dichlorodifluoromethane	0.509	J			"	0.5250		97%	90-120		
Surrogate: Dichlorotetrafluoroethane	0.0249	J			"	2.000E-2		125%	80-120		
Surrogate: Trichlorofluoromethane	0.238				"	0.2390		100%	90-120		
Surrogate: 1,1,2-trichloro-1,2,2-trifluoroethane (Freon	0.0894				"	7.300E-2		123%	90-120		
Surrogate: 1,1,1-Trichloroethane	4.00E-3	J			"	5.000E-3		80%	80-120		
Surrogate: Carbon tetrachloride	0.0933				"	8.600E-2		108%	80-120		

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# Environmental Protection Agency Region 5 Chicago Regional Laboratory

536 South Clark Street, Chicago, IL 60605 Phone:(312)353-8370 Fax:(312)886-2591

Air Division, US EPA Region 5 Project: BP Whiting Refinery

77 West Jackson Boulevard Project Number: [none] Reported:
Chicago IL, 60605 Project Manager: Motria Caudill Jan-21-15 11:50

#### **Notes and Definitions**

R Rejected
 K The identification of the analyte is acceptable; the reported value may be biased high. The actual value is expected to be less than the reported value.
 J The identification of the analyte is acceptable; the reported value is an estimate.
 BC Analyte is detected in the sample within 5x the amount detected in the canister certification blank and may have a high bias from residual contamination in the canister used to sample.
 U Not Detected
 NR Not Reported

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